4.0 AFFECTED ENVIRONMENT

This section of the EIS discusses aspects of the environment that potentially may be impacted by the construction and operation of the NBACC Facility. The following description of the affected environment relies heavily on previous NEPA analyses. Fort Detrick is located in the central portion of Frederick County, Maryland, within the northwest portion of the City of Frederick (see Figure 4–1). Relevant aspects of the affected environment (baseline conditions) are discussed below by environmental attribute area.

Figure 4–1. Location of Fort Detrick.

4.1 LOCATION AND LAND USE

4.1.1 FREDERICK COUNTY LAND USE

Frederick County is divided into eight planning regions that comprise geographically distinct land areas within the county. The City of Frederick and Fort Detrick are located in the Frederick Region, which is bordered by the Monocacy River to the east, the Catoctin Mountains to the west, Little Hunting Creek to the north, and Ballenger Creek to the south. Land use and development for the county is guided by eight regional plans. Fort Detrick is described in the *Frederick Region Plan*, which provides recommendations for land use through the year 2045 (Frederick County Department of Planning and Zoning, 2003).

Frederick County covers approximately 665 square miles, comprised of 79.7 percent agricultural land/woodland, 10.3 percent residential land, 5.4 percent parkland and open space, 2.5 percent utilities and government land, 1.3 percent industrial and limited industrial land, and 0.9 percent commercial land (Frederick County Department of Planning and Zoning, 2003).

4.1.2 CITY OF FREDERICK LAND USE

The City of Frederick covers 20.8 square miles. According to the 2002 *City of Frederick Growth and Development Report*, land use within the city is distributed as follows: according to the most recent available data, 65 percent of land within the city is devoted to residential uses, 17 percent

to
institutional uses, 12 percent to employment uses (e.g., office and office research), and 6 percent to commercial uses (City of Frederick Planning Department, 2002). The City of Frederick is currently in the process of updating its Comprehensive Plan. However, land uses in the areas surrounding Fort Detrick have not changed significantly during the past eight years and are essentially as described in the 1995 plan (Bennett, 2003a). The City Planning Department has characterized all of Fort Detrick as institutional land. Areas adjacent to Area A of the Installation are predominately zoned as residential. Some of the land to the west of Area A is zoned as commercial. The land occupied by Frederick Community College (FCC), to the northeast of Area A, is designated as institutional (City of Frederick Planning Department, 1995).

4.1.3 FORT DETRICK LAND USE

As an Army installation, Fort Detrick maintains its own land use planning. Although the Installation is located within the city limits of Frederick, local land use regulations are not binding. Land use planning at Fort Detrick is designed to conform and complement local community planning to the maximum extent possible. With its own infrastructure, residential and commuter populations, and community services, Fort Detrick is largely an independent community within the City of Frederick.

Fort Detrick consists of four separate parcels of land (Area A, Area B, and two parcels that make up Area C) covering a total of approximately 1,143 acres (see Figure 4–2). Area A of Fort Detrick (approximately 728 acres) is the largest and most intensively developed of the four parcels. It is the location of administrative buildings, community service facilities, recreation areas, advanced research and development complexes, and military and family housing units. Area B (approximately 399 acres) is located west-southwest of Area A and is separated from it by an area of land ranging in width from 0.2 to 1.0 mile. Area B is used for agricultural research, animal grazing and maintenance, U.S. Army Reserve training, communication antennas, and a sanitary landfill. According to the *Area B Master Plan EA*, the following land uses are proposed for Area B: 18-hole golf course, indoor shooting range, paintball fields, recreational vehicle park, and an antenna relocation area (USAG, 2004a). Area C, which is exclusively used for industrial operations, consists of two small tracts located along the west bank of the Monocacy River, approximately 0.8 miles east of Area A. The northern tract of Area C (approximately 7 acres) contains the Fort Detrick WTP. The southern tract (approximately 9 acres) lies ¼ mile downstream from the WTP, and contains the Fort Detrick WWTP (USAG, 1998).

The rapid expansion of Fort Detrick during and following World War II (WWII) strongly influenced existing land use. Facilities constructed at that time were situated based on need, economics, and expediency. Many “temporary” structures constructed during this time period still exist on the Installation. In recent years, many of these facilities have been either upgraded or demolished and replaced with new buildings. Since WWII, land uses typically have been determined according to usage needs, compatibility, and utility support (DA, 1991).

4.1.4 INSTALLATION MASTER PLANNING

In accordance with AR 210-20, *Master Planning for Army Installations* (1993), Fort Detrick maintains an active planning program. Current land use and development at Fort Detrick are described in the *Installation Master Plan (IMP) EA* (USAG, 2003a). The goal of the IMP is to

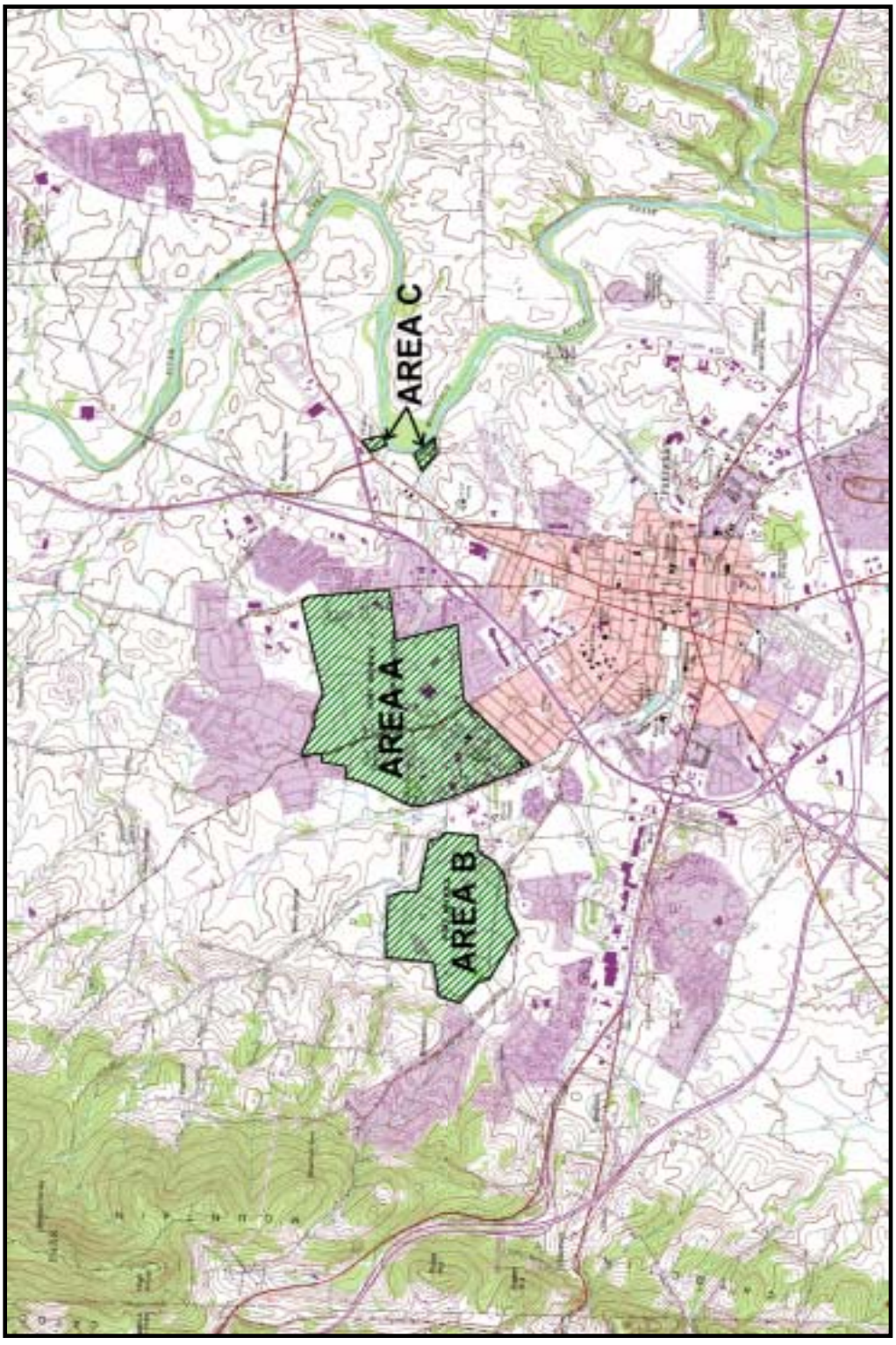

Figure 4–2. Area Location Map of Fort Detrick.

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provide a comprehensive plan to direct future development and efficient management of limited resources. In addition to land use, the IMP also addresses areas of concern such as environmental protection, transportation, natural resources, and fire/safety issues. The Land Use Plan for Fort Detrick was effective April 2003 (USAG, 2003a).

Changes in the planning process typically occur with modification to the Army's regulation on Master Planning (AR 210-20). The Installation RPPB advises the Installation Commander on changes to the IMP. AR 210-20 requires that all Army installations maintain a planning board. The Fort Detrick RPPB is comprised of representatives from the command, operational, engineering, and planning divisions of the Installation, as well as the tenant activities. The Real Property Planning Board, Working Group (RPPB-WG) was recently created to act on behalf of the RPPB to resolve the day-to-day, non-controversial planning issues on the Installation and to advise the RPPB on major decisions.

4.1.5 LAND USE ON AND SURROUNDING THE PROPOSED NBACC FACILITY SITE

USAG has set aside approximately 200 acres on Area A for the NIBC which is located between the densely developed southwestern half of Area A and the largely undeveloped northeastern portion. Specifically, the proposed construction site for the NBACC Facility is an approximately 7.07-acre parcel of undeveloped grassland within the south-central portion of Area A (see Figure 2–2). The proposed NIAID IRF will be located approximately 135 ft. south of the proposed site of the NBACC Facility. See Section 2.2 for further details, including photographs of this site.

Land use features surrounding the proposed site of the NBACC Facility include U.S. Army Medical Materiel Agency (USAMMA) / Air Force Medical Logistics Office (AFMLO) / Joint Readiness Clinical Advisory Board (JRCAB) administrative buildings to the west and southwest, USAMRIID laboratory and research facilities to the southwest and south, Building 1434 (Barquist Army Health Clinic) to the southeast, Building 1435 (21st U.S. Army Signal Brigade) to the northeast, and forested land (Forest Block 1) and an electrical power transmission line right-of-way to the north. Currently, undeveloped grassland is present on the proposed site of the NBACC Facility. Table 4-1 provides a complete list of the buildings located within 1,700 ft. of the proposed site of the NBACC Facility. The table shows the age, occupancy, past and current usage, and distances of the buildings closest to the proposed site of the NBACC Facility (Federline, 2002a; 2002b).

Building 1425, which is located approximately 660 ft. south of the proposed NBACC Facility site, is the largest USAMRIID facility at Fort Detrick (see Figure 2–12). The building contains approximately 418,223 ft.^{2} of laboratories, administrative offices, and general and hazardous materials storage space (USAMRMC, 2001). Another USAMRIID facility, Building 1412, is an approximately 74,000-ft.^{2} laboratory located approximately 846 ft. southwest of the proposed NBACC Facility site (see Figure 2–12). Building 1412 is primarily used for aerosol testing but also contains a non-human primate housing facility (USAMRMC, 2001). Buildings 1412 and 1425 were constructed on previously undeveloped land in 1958 and during 1969-1972, respectively (Federline, 2002a). Building 1414 was originally an exhaust air incinerator sterilization building associated with Building 1412, and it is now used by USAMRIID for storage purposes (USAMRMC, 2001). (Photographs in Figure 2–7 and Figure 2–8 show these USAMRIID buildings).

The Barquist Army Health Clinic (Building 1434), which was opened in 2000, neighbors the proposed NBACC Facility site approximately 382 ft. to the southeast (see Figure 2–12). This roughly 26,000-ft.^{2} building is located on previously undeveloped land. The health clinic consolidates various health services that were previously housed in separate buildings around Fort Detrick. The clinic provides standard primary care services; specialty services, such as cardiology, optometry, radiology, and travel medicine; an in-house pharmacy; and a laboratory (USAG, 2003b).

4.2 CLIMATE

Frederick County has a temperate, continental climate with four distinct seasons. Summers are usually short, warm, and occasionally humid. Winters are mostly mild with intermittent periods of cold. Local weather patterns are influenced by the Catoctin Mountains; a north-south trending mountain range located approximately 5 miles west of Fort Detrick (USAG, 1998). The annual average temperature for the City of Frederick is 56.3 $^\circ$F, and the historical extreme temperatures are -12 $^\circ$F in winter and 109 $^\circ$F in summer (Jones, 2003; Maryland State Office of Climatology, 2002). The average annual precipitation for Frederick is 40.8 inches (Jones, 2003). During normal years, precipitation in the region is sufficient to provide an adequate water supply. However, due to substantial rain deficits, the Central Region of Maryland was in a drought emergency for the greater part of 2002. Level I and Level II mandatory water usage restrictions were in effect for the entire region, including all of Frederick County. Level II water usage restrictions eased to Level I on 18 December 2002 and were lifted completely on 20 February 2003. As of 31 March 2003, all hydrologic indicators in the Central Region of Maryland have returned to normal (MDE, 2003a).

The prevailing wind direction for the area is west-southwesterly with an annual average velocity of 7.4 miles per hour. Prevailing winds in the region influence seasonal climatic variations in the Fort Detrick area. In the winter months (October - April), prevailing winds are from the northwest and bring clear, cool weather. During the summer (May - September), a large high-pressure system in the Atlantic Ocean, known as the Bermuda High, frequently influences the region. This system brings warm, moist air into the region from a southwesterly direction (MDE, 2000a).

The storm events database of the National Climatic Data Center (NCDC) lists the following extreme weather events for Frederick County between 01 January 1950 and 28 February 2003: 22 tornados, 34 floods, 24 hail events, 15 heavy rain events, 50 snow and ice events, 18 lightning events, 128 thunderstorms and high wind events, and 10 droughts (NCDC, 2003).

4.3 GEOLOGY

4.3.1 PIEDMONT PLATEAU PHYSIOGRAPHIC PROVINCE

Fort Detrick lies in the western part of the Piedmont Plateau Physiographic Province (Appalachian Highlands) in a geologic subdivision known as Frederick Valley. The Piedmont Plateau extends from the Fall Line between the Coastal Plain and Piedmont Plateau Physiographic Province in the east to the Catoctin Mountains of the Blue Ridge Physiographic Province in the west. The Piedmont Plateau is characterized by rolling terrain and rather deeply incised stream valleys and comprises approximately 29 percent of Maryland's land area. Frederick Valley trends north to south, extends 26 miles, and is six miles wide. Directly west of Frederick Valley are the Catoctin Mountains. The Frederick Valley is known as the Frederick

Table 4-1. Usage and Proximity of Buildings Closest to the Proposed NBACC Facility Site.

Building Number	Year Built	Occupant	Usage		Distance (feet) and Direction from the Proposed NBACC Facility	
			Past	Current		
1432	1994	USAMMA / AFMLO	Administrative	Administrative	317	West
1434	2000	U.S. Army Medical Department Activity (MEDDAC)	Health Clinic	Health Clinic	382	Southeast
1438	2002	USAMRIID	Storage	Storage	530	South
1423	1987	USAMMA / AFMLO / JRCAB	Administrative	Administrative	560	Southwest
1436	1998	USAMRIID	Administrative	Administrative	634	South
1433	2002	Trailer being leased by IBM as part of a USAMMA contract	Administrative	Administrative	655	Southwest
1425	1969	USAMRIID	Laboratory	Laboratory	659	South
1408	2003	USAMRIID	AF (Under Construction)		696	Southwest
1412	1958	USAMRIID	Laboratory	Laboratory	846	Southwest
1542	N/A	Trailer owned by USACE	Administrative	Administrative	874	Southeast
1533-1538	1998	USAG, Housing	Barracks	Barracks	975	Southeast
1435	1998	21st U.S. Army Signal Brigade	Administrative	Administrative	1,051	East
1414	1958	USAMRIID	Air Incinerator	Storage	1,065	Southwest
1415	1959	Union	Access Control Facility (Guard Shack)	Union Office	1,072	Southwest
1422	1963	USAG, DOIM	Computer Center	Computer Center	1,164	Southwest
1520	1967	USAG, Directorate of Community Services (DCS) / Defense Commissary Agency (DeCA)	Warehouse	Community Support/ Commissary	1,169	South

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Table 4-1. Usage and Proximity of Buildings Closest to the Proposed NBACC Facility Site (continued).

Building Number	Year Built	Occupant	Usage		Distance (feet) and Direction from the Proposed NBACC Facility	
			Past	Current		
1420	1997	USAG, Directorate of Information Management (DOIM)	Standby Generator	Standby Generator	1,181	Southwest
1532	1998	USAG	Community Support Facility	Community Support Facility	1,193	Southeast
1507	1999	USAG, DCS	Fitness Center	Fitness Center	1,196	South
1426	1969	USAMRIID	Access Control Facility (Guard Shack)	Storage	1,212	South
1418	2001	USAG, DOIM	Controlled Humidity Warehouse (Computer Tape Storage)	Controlled Humidity Warehouse (Computer Tape Storage)	1,272	Southwest
1540B	1998	U.S. Army Information Systems Command (USAISC), U.S. Army Security Force (USASF)	Company Operations	Company Operations	1,317	East
1313	1973	USDA	Storage	Storage	1,326	Northwest
1531	1993	USAG	Simulator Training Building (Firearms and Medical)	Storage	1,361	Southeast
1417	2001	USAG, Morale, Welfare, & Recreation	Car Wash	Car Wash	1,365	Southwest
1530	1992	USAG, DCS	Storage	Storage	1,371	Southeast
1308	1977	USDA	Storage	Storage	1,389	Northwest
1431	1984	USAG	Automobile Service Center	Automobile Service Center	1,397	Southwest
1430	1961	USAG	Barracks	Administrative	1,408	Southwest

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Table 4-1. Usage and Proximity of Buildings Closest to the Proposed NBACC Facility Site (continued).

Building Number	Year Built	Occupant	Usage		Distance (feet) and Direction from the Proposed NBACC Facility	
			Past	Current		
1303	1956	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,430	Northwest
1316	1957	USDA	Storage	Storage	1,439	Northwest
1312	1957	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,452	Northwest
1404	1957	USAG, Housing	Garage	Garage	1,469	Southwest
1315	1965	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,482	Northwest
1304	1956	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,487	Northwest
1400/1401	1953	USAG, Housing	Housing	Family Housing	1,519	Southwest
1309	1982	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,538	Northwest
1650	1974	USAISC	Communications	Communications	1,573	Northeast
1301	1956	USDA/USAMRIID	Laboratory	Laboratory	1,578	Northwest
1305	1956	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,600	Northwest
1307	1974	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,604	Northwest
1300	2001	USAMRIID	Administrative	Administrative	1,617	Northwest
1302	1956	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,619	Northwest
1016	1951	USAG, Housing	Housing	Family Housing	1,637	Southwest
1306	1956	USDA	Greenhouse Laboratory	Greenhouse Laboratory	1,657	Northwest
1776	1993	USAG	Community Support Facility	Community Support Facility	1,665	West

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Syncline, and the Catoctin Mountains are part of an overturned anticline known as the South Mountain Anticlinorium (USACE, 2000a).

The Piedmont Plateau ranges in elevation from approximately 100 ft. to 1,000 ft. above sea level (MDNR, 1999). Elevations at Fort Detrick range from 320 ft. to more than 400 ft. above sea level (USGS, 1993). Specifically, the proposed site of the NBACC Facility ranges in elevation from approximately 356 ft. to 362 ft. above sea level, generally sloping from the northwest to the southeast (USGS, 1993).

4.3.2 REGIONAL GEOLOGY

The regional geology underlying Area A is the fractured limestone and dolomite of the Upper Cambrian Frederick Formation, which consists of the Lime Kiln, Rocky Springs Station, and Adamstown members (see Figure 4–3). The Frederick Formation has been known to develop karst features such as sinkholes. Specifically, Area A is bisected by the contact between the Rocky Springs Station Member (western portion) and the Adamstown Member (eastern portion). The proposed location for the NBACC Facility is underlain by the Adamstown Member, a fine-grained, thin-bedded, dark gray limestone containing several traceable breccia stones (USAG, 2003a). The northwestern portion of the NIBC (i.e., Buildings 1300-1313) is underlain by the Rocky Springs Station Member, a thinly-bedded limestone containing dolomite and layers of coarse quartz sand (USAG, 2003a).

4.3.3 SINKHOLES AND DEPRESSIONS

Sinkholes are known to develop in the Frederick Formation. These circular depressions in the landscape are created when groundwater dissolves underlying limestone and the resulting cavity collapses. The potential for the formation of sinkholes increases in response to unnatural surface loading (e.g., building construction and stormwater retention) on enclosed topographic depressions (USAG, 2003a). Also, because sinkholes can accelerate surface water and contaminant entry into an aquifer, they can become gateways for groundwater contamination (USACE, 2002a). Based on interpretation of aerial photographs and USGS quadrangle maps for topographic characteristics, vegetation, and soil tone, several sinkholes/depressions have been identified on or near Area A of Fort Detrick. None of these sinkholes are located on the proposed location for the NBACC Facility (see Figure 4–4). The closest sinkhole, covering an area of approximately 2.7 acres (115,720 $ft.^2$), is located approximately 1,300 ft. west of the proposed NBACC Facility site (USACE, 2001). More detailed geotechnical studies are planned to determine if the proposed NBACC Facility site has potential for sinkhole development not apparent from the USACE study (2001).

4.3.4 FRACTURE TRACES AND LINEAMENTS

Fracture traces and lineaments are linear features that may suggest the presence of natural, geologic features, such as faults and joints; or they may reflect man-made structures, such as fence lines, or drainage ditches (see Figure 4–4; USACE, 2001). Subterranean fracture traces that are connected to the aquifer may represent pathways for groundwater flow and influence the regional groundwater flow regime (USACE, 2002a). A photogeologic analysis of fracture traces in Area A identified one fracture trace located directly on the proposed site of the NBACC Facility and one located immediately east of the proposed NBACC Facility site. The fracture trace that is located directly on the proposed NBACC Facility site is approximately 630 ft. long

and
runs west to east through the central portion of the site. The fracture trace that runs through the proposed site of the NIBC Parking Lot is approximately 1,600 ft. long in a zigzag pattern. It originates southeast of Building 1434 and transects the central portion of the proposed NIBC Parking Lot site (USACE, 2001).

4.3.5 SEISMIC CONDITIONS

Fort Detrick is located within a Seismic Zone 1 area with seismic coefficients ranging from 0.03 to 0.07. Seismic coefficients, in general, range from 0.0 to 0.27, with high values indicating high risk of earthquake. Seismic Zone 1 is characterized as an area that may receive minor damage due to distant earthquakes (USAG, 2003a). Nearly all of Maryland, including Frederick County, is classified as a "region of negligible seismicity with very low probability of collapse of the structure." In other words, it is not necessary to include seismic considerations in the design of new structures. Between 1758 and 1993, forty-seven earthquakes occurred in the State of Maryland (Maryland Geological Survey [MGS], 2001).

4.4 SOILS

The soils of Frederick County consist of a combination of residual lime soils and wind-transported soils, and they are among the most agriculturally productive in the State of Maryland. Duffield series soils are found extensively throughout the Frederick Valley (USACE, 2000a). The subsurface material in Area A at Fort Detrick is predominantly a reddish-brown sandy clay underlain by a hard limestone which is medium to dark gray in color (Soil Conservation Service, 1956). Two soil series, Duffield and Adamstown, are found on the southern portion of the NIBC in Area A (see Figure 4–5). The Duffield series consists of very deep, well-drained soils with moderate permeability. Available water capacity for the Duffield series soils is low to moderate. Duffield soils, predominantly silt loams, are present throughout the majority of the NIBC, including the proposed site of the NBACC Facility (USDA, 2002). The Duffield soils throughout the central portion of the NIBC are characteristic of karst landscapes with a potential for sinkhole development (USDA, 2002). The Adamstown series consists of very deep, moderately well-drained soils with slow or moderately slow permeability. Adamstown soils are present in areas northeast and southeast of the proposed site of the NBACC Facility (USDA, 2002). Soils in the above series are fertile, highly productive, easy to manage, and have the ability to support a variety of vegetation (USACE, 2000a; Soil Conservation Service, 1956). The general slope of soils at the proposed site of the NBACC Facility ranges between 0 and 3 percent (USDA, 2002). In addition, soils at the proposed NBACC Facility site have been disturbed by a trenching investigation that was completed in April 2003 for the former south-central Area A disposal site (see Section 4.17.1.5, Figure 4–12, Figure 4–15, and Figure 4–16).

4.5 WATER RESOURCES

4.5.1 SURFACE WATER

Fort Detrick is located within the Monocacy River drainage basin, a sub-basin of the Middle Potomac River Basin, which covers approximately 986 square miles (USEPA, 2001). Approximately 75 percent of this watershed area is located within the State of Maryland, with the remainder in Pennsylvania. The land use in the Monocacy River Basin is predominately agricultural (75 percent) and supports approximately 3,500 farms with an average farm size of

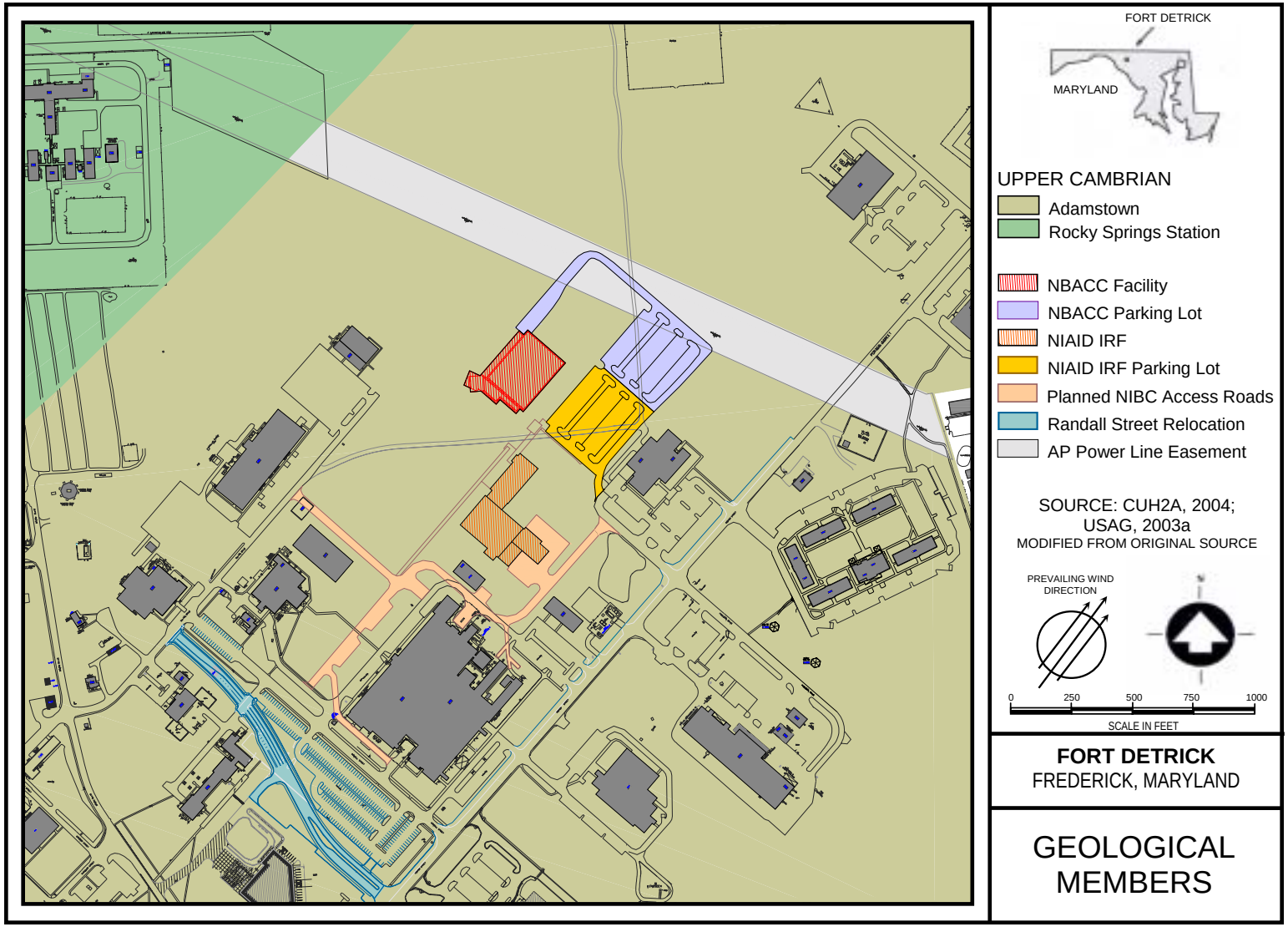

Figure 4–3. Geological Members on the Proposed NBACC Facility Site.

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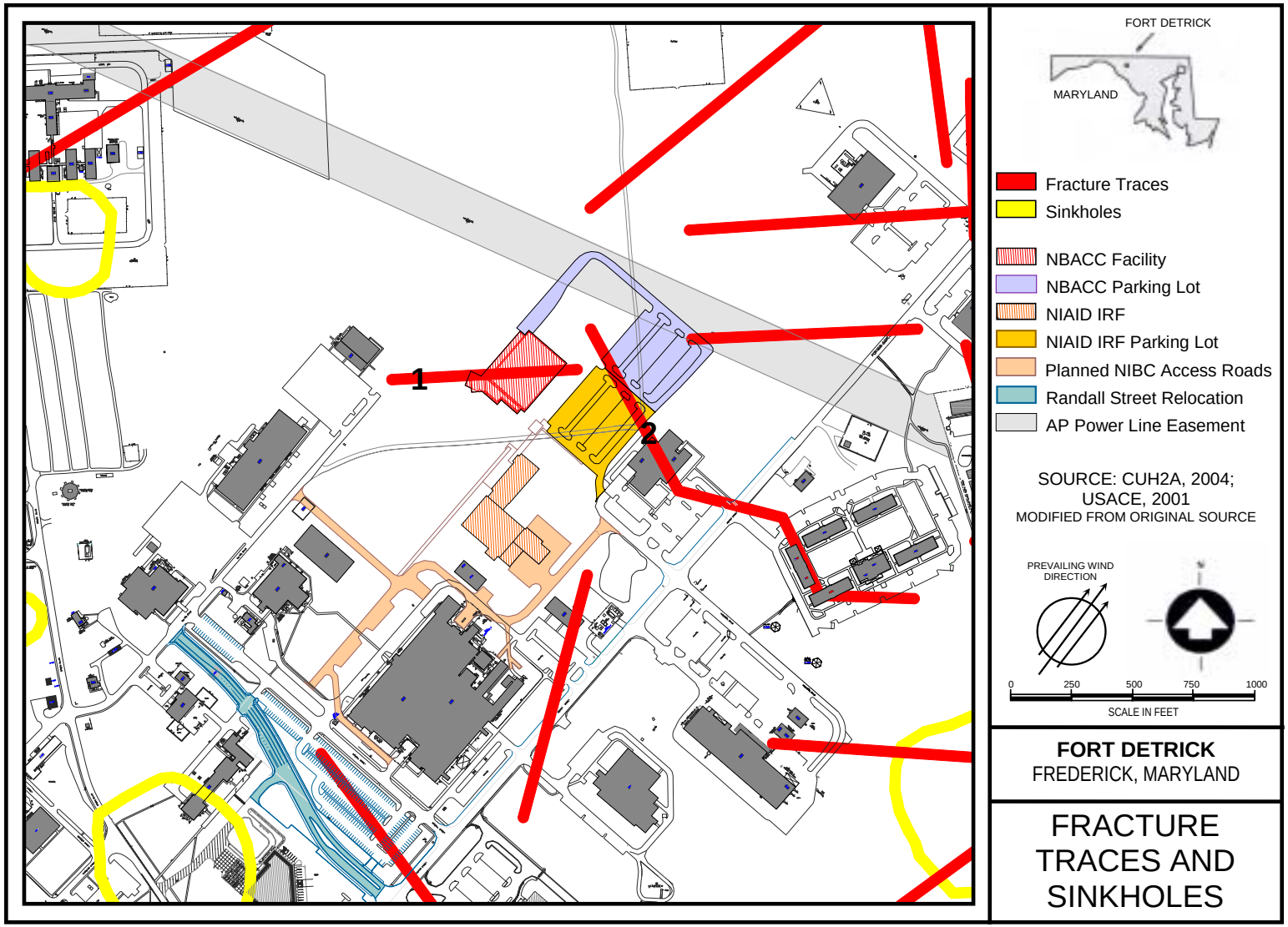

Figure 4–4. Fracture Traces and Sinkholes on the Proposed NBACC Facility Site.

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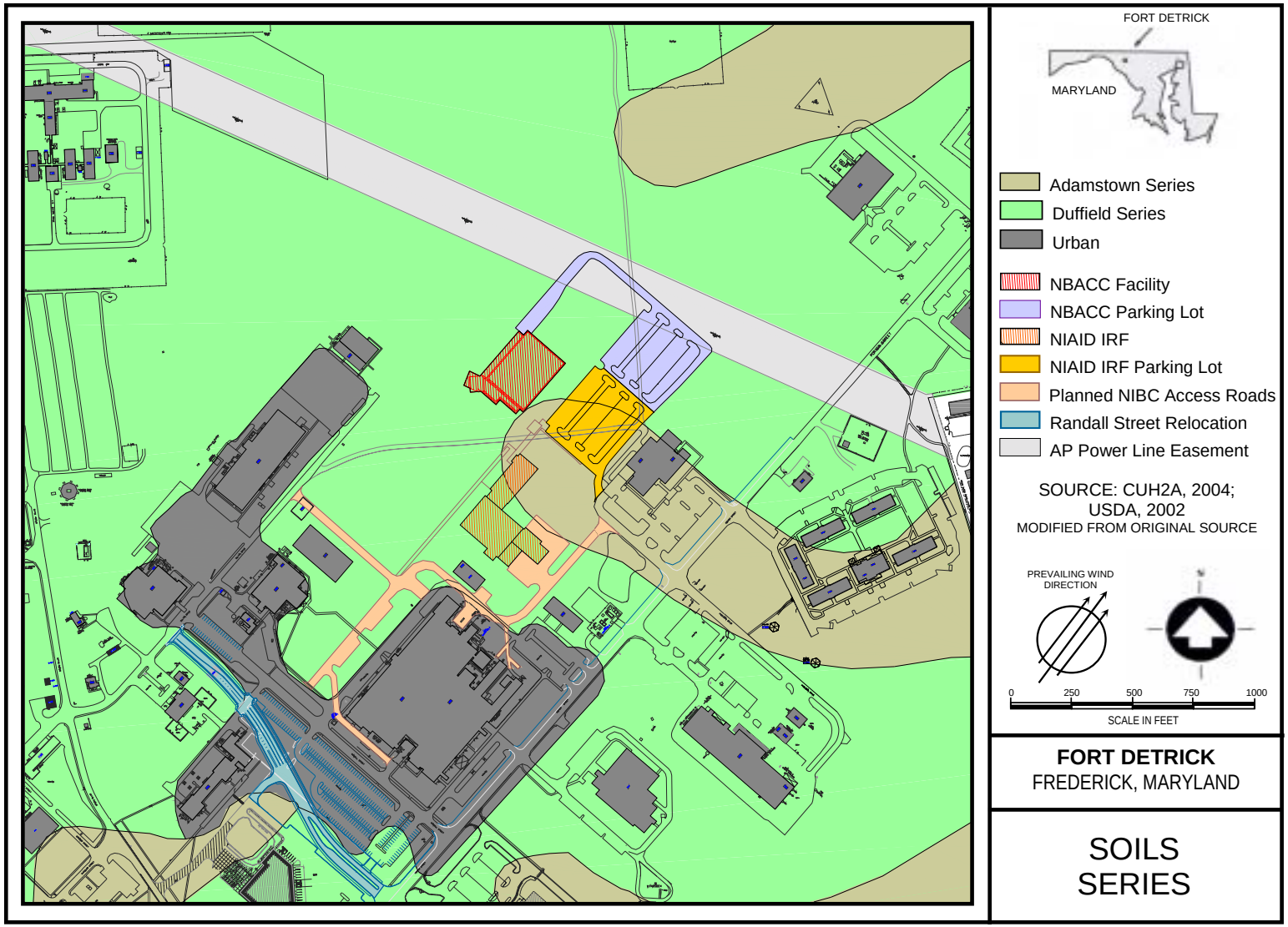

Figure 4–5. Soils Series on the Proposed NBACC Facility Site.

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150 acres. The remaining land uses in the watershed include forests, the City of Frederick, and residential neighborhoods (Alliance for the Chesapeake Bay, Inc., 2002).

The Monocacy River ranges from 40 ft. to 375 ft. in width and from 0.5 ft. to 18 ft. in depth. This major stream originates at the Maryland-Pennsylvania border and flows south, passing Fort Detrick and the City of Frederick to the east. The Monocacy River joins the Potomac River approximately 15 miles south of the City of Frederick and eventually discharges into the Chesapeake Bay. Area A of Fort Detrick is located approximately 1.5 miles to the west of the Monocacy River (USAG, 1998).

Stream discharge rates of the Monocacy River near Fort Detrick are obtained from measurements collected at the Jug Bridge gauging station, located approximately five miles southeast of Area A (USGS, 2000). This station drains approximately 817 square miles of the watershed above the City of Frederick (USGS, 2002a). Based on 75 years of record (1929 to 2003), daily mean flow recorded at this station has ranged from a minimum of 19 cubic feet per second (cfs) (12 mgd) to a maximum of 73,873 cfs (47,742 mgd). The average annual streamflow for this period of record was 938 cfs (606 mgd) (USGS, 2003). During this period of record, the maximum instantaneous discharge of 81,600 cfs (52,645 mgd) occurred on 23 June 1972, and the minimum instantaneous discharge of 17 cfs (11 mgd) took place on 11 and 13 September 1966 (USGS, 2002a). The flood threshold at the Jug Bridge gauging station corresponds to a discharge of approximately 15,500 cfs (10,000 mgd); therefore, flood events are not uncommon (USGS, 2000; National Weather Service, 2002).

The Monocacy River is used as a source for drinking water, and it is also used for agricultural irrigation, boating, canoeing, and recreational fishing. It is a warmwater fishery and has been classified by the State of Maryland as Recreational Trout Waters and Public Water Supply (Use IV-P; COMAR 26.08.02). Use IV-P waters are managed as special fisheries by periodic stocking and seasonal catching and have the potential for supporting adult trout populations for put-and-take fishing. Tributaries to the Monocacy River that are not designated Use IV-P are designated as Use III-P (Natural Trout Waters and Public Water Supply). These tributaries must maintain water quality standards that ensure the growth and propagation of self-sustaining trout populations and their associated food organisms. Use III-P tributaries must provide a safe and effective public water supply source. Carroll Creek, the major tributary to the Monocacy River in the vicinity of Frederick, is classified for Use III-P. This creek originates in the wooded uplands of the Catoctin Mountains (1.8 to 2.0 miles west of Frederick), flows southward between Area A and Area B, and discharges into the Monocacy River (USAG, 2003a).

The Monocacy River is a water supply source for both the City of Frederick and Fort Detrick (see Section 4.5.4). The City of Frederick draws approximately 28 percent of its drinking water (an average of 1.93 mgd) from the Monocacy River (Seal, 2002). Fort Detrick relies on the Monocacy River as its sole source for drinking water and currently withdraws water at an average rate of about 1.5 mgd (Grams, 2003b). However, in cases of emergency or if a plant is shut down for repair, Fort Detrick and the City of Frederick exchange water between their water distribution systems through a manual connection on Area A (see Section 4.5.4.3; Grams, 2003a). The Installation's water treatment plant holds MDE Water Allocation Permit FR43S001(02), which authorizes withdrawal of water from the Monocacy River at rates up to a daily average of 2.0 mgd or 2.5 mgd daily maximum. This permit expires in 2012 (USAG, 2003a). The Installation provides drinking water that meets or exceeds all Federal, State (COMAR 26.04.01), and DA criteria (Grams, 2003a). The anticipated consumption of water by

the proposed NBACC Facility is likely to be a very minor portion of the total water consumption of the Installation.

In 2002, Frederick County, as well as the State of Maryland, experienced the worst drought conditions since the 1930s (Greenfield, 2002). The highest mean monthly streamflow in CY 2000, the last year before the recent drought, was 2,033 cfs (1,314 mgd) in March, and the lowest mean monthly streamflow was 275 cfs (177 mgd) in October (USGS, 2002b). By contrast, the CY 2002 streamflow ranged from the highest mean monthly streamflow of 1,752 cfs (1,132 mgd) in December to the lowest mean monthly streamflow of 62 cfs (40 mgd) in August (USGS, 2003). Level One Mandatory Water Use Restrictions were implemented after emergency drought conditions were declared by former Governor Parris N. Glendening (MDE, 2003a). Restrictions included prohibitions on the use of water for residential landscaping, washing of paved surfaces, non-recycling water ornamental fountains, washing of vehicles, as well as unsolicited service of tap water in food service establishments. As of 20 February 2003, the drought emergency in the central region of Maryland was lifted, including Frederick County, removing Level One Mandatory Water Use Restrictions (MDE, 2003a). While drought-related water restrictions on the Installation were lifted on 06 March 2003, Colonel John E. Ball, Deputy Installation Commander, urged the Installation to voluntarily reduce water consumption.

Primary surface water features in Area A include the 3.3-acre Nallin Farm Pond and two tributaries of the Monocacy River. The Nallin Farm Pond, which is located approximately 2,600 ft. northeast of the proposed NBACC Facility site, was formed by the diking of natural springs (USAG, 2003a). A permit issued by the MDE to use the Nallin Farm Pond for emergency consumptive uses (Water Appropriation and Use Permit FR43S101(01)) was inactivated on 24 April 2000. However, Fort Detrick can use the Nallin Farm Pond for emergency firefighting purposes, which does not require a permit (Sheffer, 2002a).

One of the aforementioned tributaries of the Monocacy River, Tributary #10 (Two Mile Run), extends south from the Nallin Farm Pond, then flows east, exiting the eastern portion of Area A at Outfall A-6 and discharging into the Monocacy River approximately one mile east of Area A (DA, DIS, 2001). This stream formerly originated on the FCC property. It entered the north-central boundary of Area A, flowing southeastward, then it turned toward the south and discharged into the Nallin Farm Pond. During a site visit conducted in April 2002, the upper stretch of the tributary was not seen. Agricultural activities involving the plowing and cutting of grass for hay bales may have contributed to the absence of this tributary (Sheffer, 2002a).

Tributary #9 (Detrick Branch) originates in the south-central portion of Area A, just south of Building 1434. The small stream flows east through a swale that runs adjacent to a stormwater retention basin, located immediately south the unattached enlisted personnel housing (UEPH), and from there it flows to the southeastern boundary of the Installation. The tributary exits Area A at Outfall A-4 and discharges into the Monocacy River approximately one mile east of Area A.

In total, there are eight distinct and separate surface water outfalls that drain from Area A. Four of these outfalls (A-1, A-2, A-7, and A-8) drain toward Carroll Creek. The other four outfalls (A-3, A-4, A-5, and A-6) drain toward the Monocacy River (General Physics, 2004).

The stormwater retention pond adjacent to Building 1434 was built during 1998 and 1999. This pond contained water during the emergency drought conditions of 2002, and it was therefore determined to be fed by groundwater (DHS and USAG, 2004). This retention pond contains

various amounts of water throughout the year. During the summer months of 2004, it was observed to be a “mostly dry mud hole.” It supports crayfish (*Cambarus* sp.) and a limited population of mosquito fish (*Gambusia affinis*). However, it is not considered a wetland due to the lack of hydric soils and wetland vegetation. This retention pond has been reconfigured to allow for an extension of Freedman Drive (see Section 4.5.3; Boyland, 2002; Silvestri, 2002c). Additionally, the developers of the NIAID IRF are planning to enlarge the retention pond to make it the primary stormwater quantity and quality management feature for the NIAID IRF and its associated parking lot (Lewis, 2004b).

4.5.2 GROUNDWATER

The Frederick area of the Piedmont Plateau Physiographic Province has the most productive hard rock aquifers within the State of Maryland. These aquifers have generally good water quality, and approximately 20 percent of these formations have the potential to yield at least 50 gpm of water (Maryland Office of Environmental Programs, 1986). Groundwater is transported through the carbonate aquifers via bedding planes, fractures, joints, faults, and other partings that have been enlarged by the dissolution of the carbonate bedrock (Trapp and Horn, 1997). The Fort Detrick Photogeologic Analysis (USACE, 2001) indicates numerous fracture traces and lineament features on Area A that could serve as potential conduits for groundwater contamination (see Section 4.3.4; Maryland Office of Environmental Programs, 1986). Groundwater underlying the Fort Detrick area flows generally to the southeast, towards the Monocacy River (USACE, 2000a).

Wells in the Frederick Limestone typically yield 120 to 170 gpm (Trapp and Horn, 1997). Portions of the aquifer underlying Area A have been compromised by a trichloroethylene (TCE) spill near Building 568. However, groundwater underlying Area A is not used for human consumption. Fort Detrick residents and workers obtain their drinking water from the Monocacy River (USACE, 2000a). Since Fort Detrick does not use groundwater as a source of drinking water, the presence of TCE does not pose a health risk to residents and workers on the Installation.

In accordance with MDE Permit No. FR34G-101(03), Fort Detrick withdraws an average of 8,000 gal of groundwater per day from one well near Building 568, which is located approximately 2,800 ft. southwest of the proposed NBACC Facility site. Groundwater withdrawn from this well is treated to remove TCE and utilized for research purposes by U.S. Army Center for Environmental Health Research (USACEHR) laboratories (USAG, 2003a). Groundwater in the area of the TCE spill flows in a southwesterly direction. This suggests that TCE-contaminated water did not and likely will not migrate onto the proposed NBACC Facility site (USACE, 2000a). The remedial investigation and required response actions for the Building 568 TCE spill site are completed; however, long-term groundwater monitoring is to continue at this location (Gortva, 2003a). For a more detailed description of the contamination present at Fort Detrick and the remedial steps being taken by the DA see Section 4.17.1.

4.5.3 STORMWATER

Fort Detrick is permitted to discharge stormwater runoff from land used for industrial operations in accordance with State Discharge Permit No. 03-DP-2527. This permit prohibits the discharge of non-stormwater into surface waters, requires annual site compliance evaluations, and mandates maintenance of a Stormwater Pollution Prevention Plan (SWPPP). Sampling of

stormwater is not required; however, sampling may be conducted as a proactive measure. Fort Detrick's SWPPP identifies potential sources of pollution associated with industrial activity on the Installation and outlines BMPs to minimize potential contamination of stormwater exiting Fort Detrick (USAG, 2003c).

The majority of the stormwater in Area A is diverted through a system of surface ditches, inlets, culverts, and storm sewer lines as it drains into Carroll Creek and two other tributaries of the Monocacy River (i.e., Tributaries #9 and #10). In general, stormwater from the central and western portions of Area A drains west into Carroll Creek. Stormwater from the eastern portion of Area A generally drains east into other tributaries of the Monocacy River. Presently, stormwater runoff from the southern portion of the NIBC drains towards Building 1434 and into the small stormwater retention pond located immediately to the south (see Figure 4–6; USGS, 1993; DA, DIS, 2001). Stormwater runoff that drains from the proposed site of the NBACC Facility will ultimately drain towards the Monocacy River by way of Outfall A-4 (General Physics, 2004). The proposed site of the NBACC Facility lies approximately 2,600 ft. south of the nearest 100-year floodplain (Federal Emergency Management Agency, 1978).

As stated above and in Section 4.5.1, there is an existing 14,520-ft.^{2} stormwater retention pond that is immediately south of Building 1434. The banks of the pond are littered with muskrat holes, and the pond is filled with sediment. It drains into a culvert, crosses Porter Street, and flows into Tributary #9 (Detrick Branch), which eventually leaves the Installation via the A-4 outfall. This retention pond was built during 1998 and 1999, but it has been reconfigured for the extension of Freedman Drive (an access road to Building 1434 and the NIBC). The eastern portion of the pond has been filled and replaced with the road. However, the approximate size of the pond has remained the same. Future grading at the site of the NIAID IRF will direct stormwater runoff from the NIAID IRF site towards this retention pond. Additionally, the future grading will divert stormwater runoff from the proposed NBACC Facility site away from the retention pond and towards a planned stormwater management pond that will be located northeast of Building 1434 (see Figure 4–6).

In accordance with 40 CFR 122.26 and COMAR 26.17.02, construction projects that disturb more than 5,000 ft.^{2} of land require a general NPDES permit that authorizes discharge of pollutants in stormwater during the construction period. USAG DIS and each tenant of USAG on the NIBC must ensure that appropriate stormwater management and sedimentation and erosion control measures are implemented. The current stormwater management system in this part of Area A is adequate for present environmental conditions. However, it will likely need to be upgraded since the NBACC Facility and associated structures will increase the amount of impervious surface area on this part of the Installation. Any upgrades to the existing stormwater management system for the proposed NBACC Facility and its parking lot must be accomplished by DHS as part of its construction project. A new regional stormwater management plan for the entire south-central portion of Area A may be required in the near future. A study evaluating stormwater management options for this portion of Area A is currently underway.

4.5.4 DRINKING WATER

4.5.4.1 Source Water

Fort Detrick owns, operates, and maintains the Installation water distribution system. Source water is withdrawn from the Monocacy River and is processed through the Fort Detrick WTP

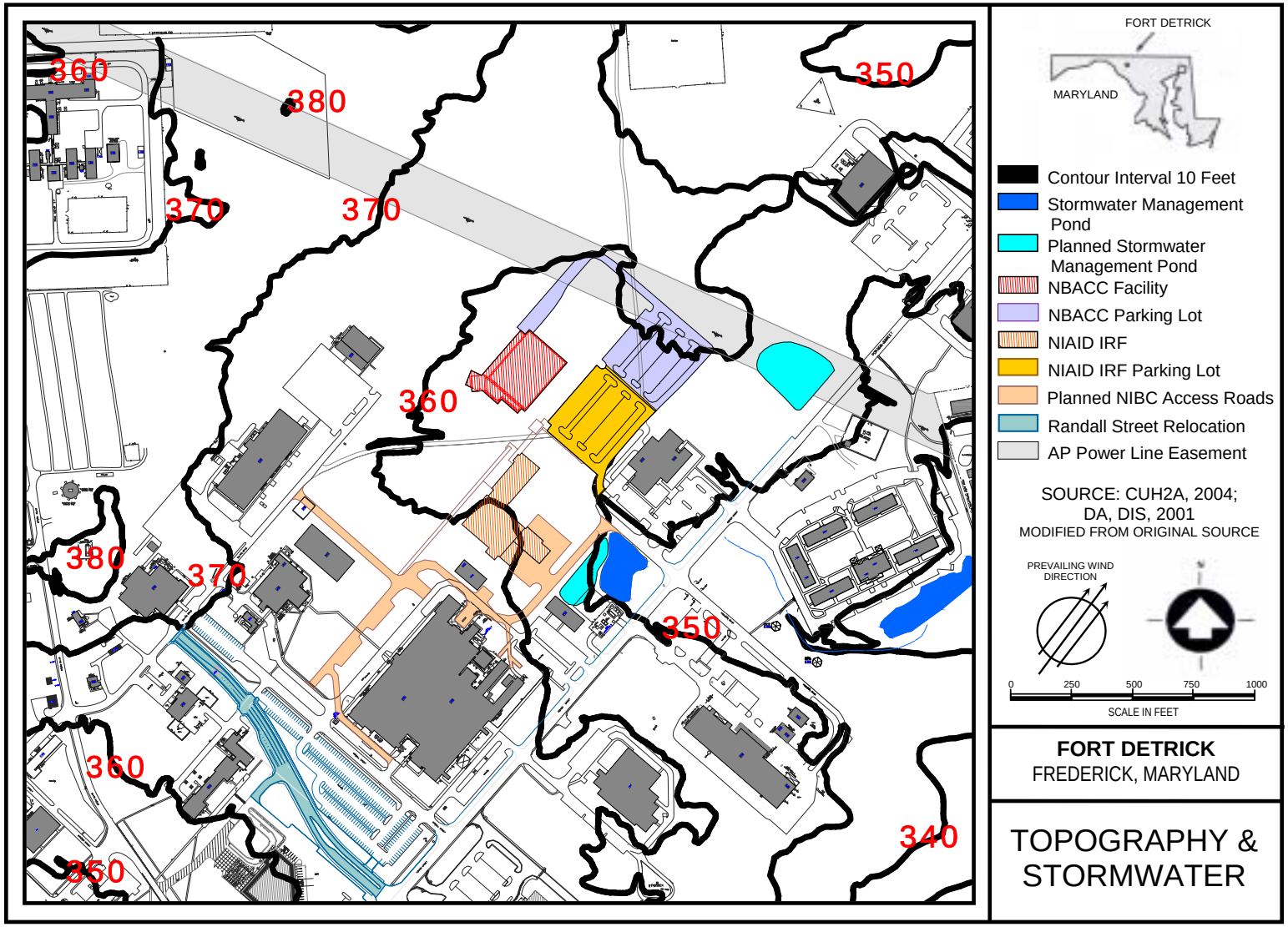

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Figure 4–6. Topography and Stormwater Management Ponds for the Proposed NBACC Facility Site.

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located in Area C approximately 1.5 miles to the east of Area A. The WTP has a maximum processing capacity of 4.25 mgd (USAG, 2000a). The MDE Water Management Administration has authorized Fort Detrick to withdraw a daily average of 2.0 mgd of water with a maximum daily withdrawal of 2.5 mgd from the Monocacy River under Water Appropriation and Use Permit No. FR43S001(02). This water allocation permit expires in 2012 (USAG, 2003a).

Water obtained in accordance with this permit is utilized as potable water, cooling water, and for sanitary facilities at Fort Detrick. Fort Detrick relies on the Monocacy River as its sole source for drinking water; however, in cases of emergency or if a plant is shut down for repair, Fort Detrick and the City of Frederick exchange water between their water distribution systems through a manual connection on Area A (see Section 4.5.4.3; Grams, 2003a). On average, the Fort Detrick WTP produces finished water at a rate of 1.3 to 1.5 mgd, producing approximately 466 million gal of water in FY01, approximately 473 million gal of water in FY02, and approximately 467 million gal of water in FY03 (Potter, 2004a; Spears, 2002a; 2002b). The WTP utilizes conventional treatment processes, and it is staffed and operated 24 hours a day (Grams, 2003b). The Installation provides drinking water that meets or exceeds all Federal, State (COMAR 26.04.01), and DA criteria (Grams, 2003a).

4.5.4.2 Water Treatment

Source water is filtered and processed by prechlorination, chemical addition with flash mixing, filtration, sedimentation, and flocculation. Chemicals added during treatment include chlorine for disinfection, activated carbon for taste and odor control, lime for pH control, and aluminum sulfate and sodium aluminate for flocculation. Water is currently chlorinated to 1.5 to 1.8 parts per million (ppm) of free residual chlorine prior to distribution (see Table 4-2; Grams, 2003a). Polymer is added to the drinking water in the winter months (Grams, 2003b). Sludge generated by the WTP is disposed of in the Area B municipal landfill.

Treated water exits from the system through four pipes, which merge into two 12-inch pipes. Subsequently, the water flows into one 16-inch pipe to the lime building where the water is chlorinated and lime is added to adjust pH. The pH of treated water is maintained at about 7.7. Finished water flows into the two clear wells with a 500,000-gal capacity. The clear wells allow for sufficient contact time for disinfection during chlorination.

Table 4-2. Monthly Average Chemical Additives (in pounds) During Water Treatment.

Chemical	2000	2001	2002	2003
Aluminum sulfate	14,045	13,930	16,049	14,239
Sodium aluminate	2,838	2,111	2,700	3,898
Activated carbon	2,461	1,508	1,596	1,837
Lime	3,846	3,163	4,325	3,779
Chlorine	2,302	1,578	1,762	1,694
Polymer	62[1]	72[2]	65[1]	46[1]

[1] Polymer average includes months when administered: January, February, March, April, November, and December.
[2] Polymer average includes months when administered: January, February, March, April, October, November, and December.
Source: Grams, 2004a; 2003b.

Disinfected water is pumped into the water distribution system (Grams, 2003a). Fort Detrick has a Cross Connection Control Plan in place. There are no known incidences of contamination of the Fort Detrick potable water supply (USAG, 2000a). Certified technicians ensure that backflow prevention devices are installed and functioning properly at all appropriate locations throughout the water distribution system (Mathews, 1998). Treated water is used for human consumption, process water, irrigation, and fire protection. The 2002 average monthly water production at Fort Detrick was approximately 38.25 million gal, which is roughly equivalent to 1.2 mgd (see Table 4-3; Grams, 2003a).

Table 4-3. Fort Detrick Total Water Production and Sewage Generation (2000-2003).

Water/Sewage	CY 2000	CY 2001	CY 2002	CY 2003
Water Produced (gal)	453,883,000	460,402,000	462,717,000	492,170,000
Sewage Generated[1] (gal)	339,072,000	317,912,000	267,912,000	371,003,000

[1] Data includes sanitary and contaminated wastewater.
Source: Grams, 2004a; 2003a.

Fort Detrick has a fluoridation system; however, fluoride is not currently added to the Fort Detrick drinking water supply. After a study and EA were completed it was determined that fluoride would be beneficial as a preventative tooth decay measure if added to the drinking water on Fort Detrick. The concentration of fluoride in the finished water will be 0.9 ppm (USAG, 2002a). The background level of fluoride in the Monocacy River is approximately 0.2 ppm (Grams, 2003a). Fort Detrick has repaired the fluoridation system, and the WTP will begin fluoridation of the drinking water supply immediately after receiving approval from MDE (Grams, 2004b).

4.5.4.3 Water Distribution System

Fort Detrick and the City of Frederick have a verbal agreement for the exchange of potable water and wastewater treatment. In cases of emergency or if a plant is shut down for repair, Fort Detrick and Frederick exchange water between their water distribution systems through a manual connection on Area A (Grams, 2003a). Metering of the shared water is not performed. There is no written agreement between Fort Detrick and the City of Frederick (Grams, 2003a). The City of Frederick pumps 28.3 percent of its drinking water from the Monocacy River (City of Frederick, 2003). This water intake is approximately 75 yards upstream from the Fort Detrick intake. The City of Frederick fluoridates their drinking water supply to a level of 0.8 to 1.0 ppm using 23 to 25 percent hydrofluosilicic acid (Luhn, 2003).

Limitations of the water supply system to support increased demands from Fort Detrick are: (1) the production capacity of the WTP; (2) line pressure and pipe size; (3) the volume of water available from the Monocacy River; and (4) the availability of source water during drought conditions. The production capacity of the WTP is 4.25 mgd of finished water; however, normally only 0.8 to 2.5 mgd of finished water are consumed at Fort Detrick (Grams, 2003a). Approximately 473 million gal of water were consumed in FY02 (Spears, 2002b). Although there is ample capacity at the WTP, the size of the existing pipes and the lack of water pressure in the distribution system are potential weaknesses of the system (Grams, 2003c). In addition, the

majority of the water distribution system is more than 40 years old, and it will likely require increased maintenance and repair in order to maintain its integrity.

The ability of the WTP to supply Fort Detrick with sufficient quantities of quality drinking water is also dependent upon the rate of flow and quality of the water received from the Monocacy River. The WTP can provide 3.1 mgd of finished water to the Installation with the current distribution system without increasing the water pressure in the distribution lines (Potter, 2003a). The Water Appropriation and Use Permit limitation of a 2.0 mgd average withdrawal of water on a yearly basis from the Monocacy River is also a limiting factor. Water losses incurred from fire hydrant flow tests, water treatment plant leaf screen flushing, building sprinkler system flushing and testing, and water main flushing and repairs amount to 904,000 gal per month or 10,848,000 gal/yr (USAG, 2000b). Currently BMPs are being implemented to minimize water usage during testing and flushing (USAG, 2000b). USAG recently completed a survey to identify leaks in the water distribution system. As a result, several leaks were identified and repaired (Potter, 2004b).

4.5.4.4 Drinking Water Standards

The Safe Drinking Water Act (SDWA), 40 CFR 141, sets forth Federal water quality standards for drinking water, and it is implemented by the DA through AR 200-1. The National Primary Drinking Water Standards of the SDWA establish Maximum Contaminant Levels (MCLs) for various contaminants in drinking water. The Water Management Administration of the MDE monitors and enforces compliance with Federal drinking water standards. The drinking water quality is monitored by Fort Detrick personnel and by the MDE. Operators conduct daily testing at the WTP water quality laboratory. The WTP operators are properly certified in accordance with 40 CFR 141.70E, COMAR 26.05.A. (1) and AR 200-1. A 2001 Environmental Compliance Assessment System (ECAS) investigation concluded that the Fort Detrick WTP is competent, with the only deficiency being the documentation of laboratory quality assurance/quality control. The WTP was also found to be in compliance with the following USEPA rules: the Surface Water Treatment Rule, the Total Coliform Rule, and the Lead and Copper Rule (Grams, 2003a).

4.6 WETLANDS

Wetlands are jointly defined by the USEPA and the USACE as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (40 CFR 230.3(t) and 33 CFR 328.3(b)). Wetlands on Fort Detrick are beneficial to stormwater management, erosion control, and sediment control. They also provide habitat for ducks, geese, herons, shore birds, muskrat, mink, and beaver and support numerous species of annual and perennial herbaceous plants (USAG, 2001). Federal activities within floodplains and wetlands are restricted under EO 11988, 33 CFR 1977, EO 11990, and AR 415-15 Appendix F-3. Wetlands are considered to be environmentally sensitive resources (AR 200-2, Section 651.29(c)). The Integrated Natural Resource Management Plan (INRMP) for Fort Detrick serves as a guide for the management and protection of wetlands at Fort Detrick to be in accordance with AR 200-3, CFR Chapter 9, and other applicable laws and regulations (USAG, 2001).

The wetlands on Fort Detrick are limited in size and number. Acreage summaries and wetland types were included in the *Wetlands Inventory Report for Fort Detrick* in the summer of 1999 by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1999). One wetland area (W-5) has been

identified in Area A (see Figure 4–7; USAG, 2001). Wetland Area W-5 consists of Nallin Farm Pond, Tributary #10 (Two Mile Run), which conveys water from the pond to Outfall A-6, and a small fenced area west of Nallin Farm Pond Drive (USAG, 2001). Wetland Area W-5 is located approximately 2,300 ft. northeast of the proposed site of the NBACC Facility and approximately 200 ft. south of the Nallin Farm House in Area A.

Wetland Area W-5 has been used for agriculture, but the majority of the area is maintained as a lawn. Nallin Farm Pond is classified as palustrine, open-water, intermittently exposed permanent, diked/impounded. The stream carrying outflow from the pond is a low quality wetland, made up of mostly upland grasses, and it is probably dry for part of the year (USFWS, 1999). It is characterized as a seasonally flooded to saturated, persistent, nontidal palustrine emergent wetland and a seasonally flooded to saturated, broad-leaved deciduous, nontidal palustrine scrub/shrub wetland. Common plants located within the W-5 wetland area include switchgrass (*Panicum virgatum*), Virginia sweet-spires (*Itea virginica*), boneset (*Eupatorium perfoliatum*), inkberry (*Ilex glabra*), arrowood (*Viburnum dentatum*), rose mallow (*Hibiscus moscheutos*), and soft-stemmed bulrush (*Scirpus validus*). Less common plants include broad-leaved cattail (*Typha latifolia*), blue flag (*Iris versicolor*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), willow (*Salix sp.*), and green ash (*Fraxinus pennsylvanica*) (USFWS, 1999).

The small fenced area west of Nallin Farm Pond Drive is classified as a seasonally flooded, persistent, nontidal palustrine emergent wetland and a seasonally flooded, broad-leaved deciduous, nontidal palustrine scrub/shrub wetland. This wetland has saturated soils that cannot support heavy mowing equipment. Common plants located within the fenced wetland include switchgrass (*Panicum virgatum*), Virginia sweet-spires (*Itea virginica*), sweet pepperbrush (*Clethra alnifolia*), inkberry (*Ilex glabra*), soft rush (*Juncus effusus*), arrowood (*Viburnum dentatum*), and sedge (*Carex sp.*). Less common plants include water birch (*Betula nigra*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), willow (*Salix sp.*), marsh yellow cress (*Rorippa palustris*), green ash (*Fraxinus pennsylvanica*), common reed (*Phragmites australis*), and wax myrtle (*Myrica cerifera*) (USFWS, 1999).

Wetland Area W-5 is the most permanent and productive wetland area at Fort Detrick. There is great potential for development and expansion of this wetland habitat (USAG, 2001). During Fall 2003, trees and shrubs were planted along the existing drainage swale that leads to the wetland area, which expanded the wetland area by 0.96 acres.

4.7 PLANT AND ANIMAL ECOLOGY

The INRMP for Fort Detrick (USAG, 2001) describes the natural resources of the Installation and provides guidance for the future management of these resources. The plan was prepared in accordance with AR 200-3 (*Environmental Quality Natural Resources - Land, Forest and Wildlife Management*, Chapter 9) and other applicable laws and regulations. The goal of the INRMP is to enhance biodiversity on a local and regional level. Implementation of the plan will assist in protecting the health of the ecosystem and environmentally sensitive areas on the Installation and will accomplish local, regional, state, and national goals for ecosystem management and enhancement of biodiversity (USAG, 2001).

Most of the ecosystems at Fort Detrick have been highly altered due to urbanization and human activities. Much of the native vegetation has been destroyed or displaced by species that are

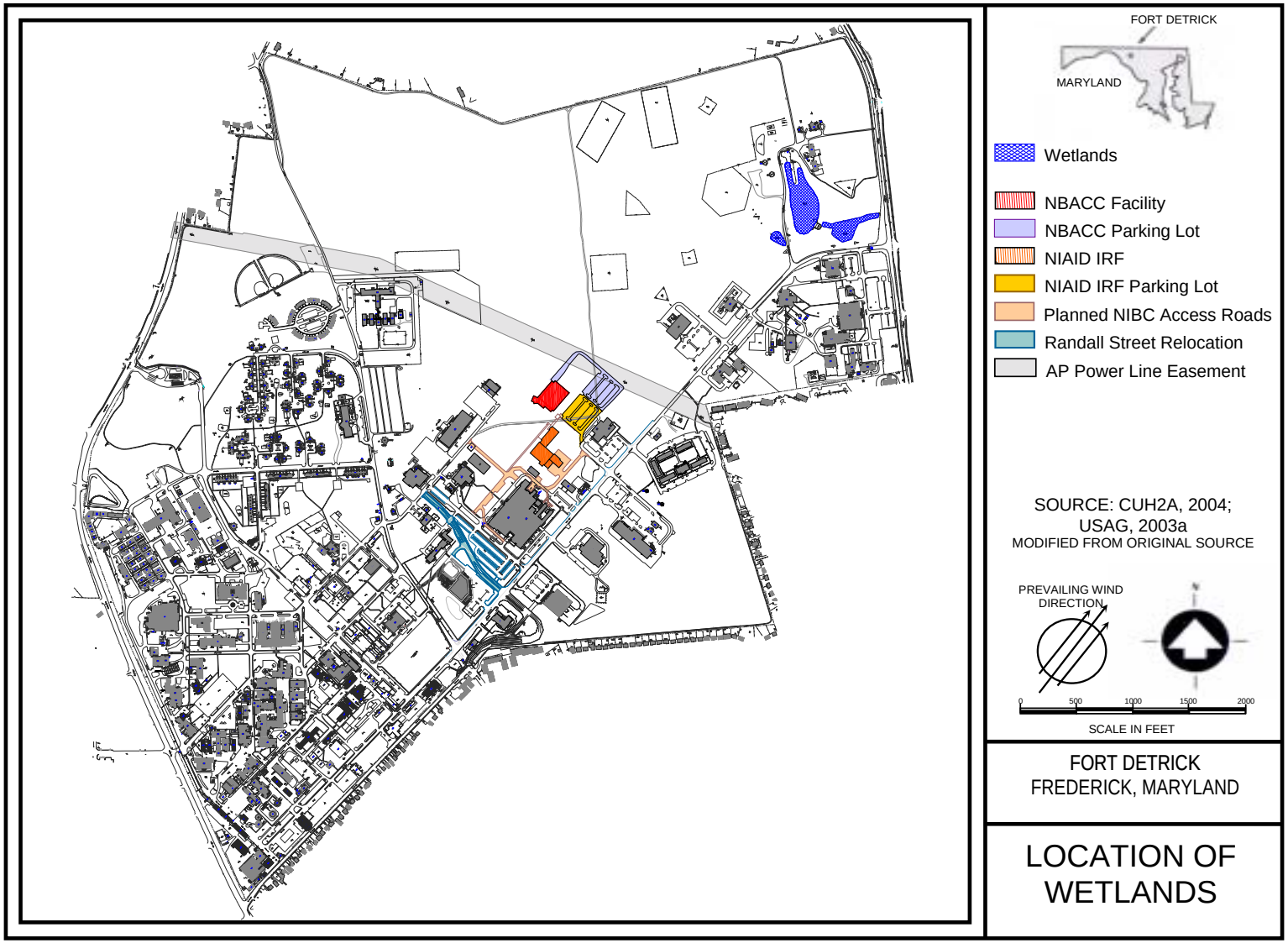

Figure 4–7. Location of Wetlands in Area A.

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more tolerant to disturbances. The three remaining types of natural communities on the Installation are upland forests, grasslands, and wetland/riparian communities. As of 2001, Fort Detrick maintained approximately 500 acres of pasture, grassland, forested areas, and experimental agricultural fields (USAG, 2001).

4.7.1 VEGETATION

The Fort Detrick area was originally covered by an oak-hickory hardwood forest. Trees characteristic of this forest type include northern red oak, black oak, scarlet oak, white oak, chestnut oak, and several species of hickories. Other trees associated with this forest type include yellow poplar, red maple, black walnut, and dogwood. Many species, including sassafras, sourwood, wild grape, Virginia creeper, and poison ivy, compose the understory of oak-hickory forests (USAG, 2001).

Area A of Fort Detrick contains three forest blocks, which vary in size from 12 to 14 acres. Forest Block 1 and Forest Block 2 contain rows of even-aged same-species plantings with little understory development. Forest Block 3 is characterized by some understory development and natural growth (see Figure 4–8 and Figure 4–9; USAG, 2001).

Forest Block 1 encompasses approximately 14 acres of even-aged planted trees. It is located approximately 134 ft. north of the proposed site of the NBACC Facility (see Figure 4–8). This is the largest and most florally diverse forest block in Area A, though it contains little developed understory. It consists of row plantings of pine, spruce, Siberian elm, red oak, and scarlet oak (USAG, 2001). A portion of this forested land was in the past monitored by the USDA for a growth regulator project (Boyland, 2004a).

Forest Block 2 is located in the northern portion of Area A, approximately 1,800 ft. northwest of the proposed NBACC Facility site. This forest block consists of two narrow strips of tree plantings, and include cherry, black locust, dogwood, black walnut, and sycamore maple (USAG, 2001).

Forest Block 3 is the smallest of the three forested areas in Area A. It covers a small hill in the western portion of Area A, about 3,500 ft. west of the proposed NBACC Facility site. This is the only forest block in Area A that is characterized by some natural growth and understory development. In the past, this area has been used for the dumping of tree trimmings, stumps, and other debris. Forest Block 3 contains silver maple, sugar maple, black locust, black cherry, American elm, quaking aspen, and tree of heaven among others (USAG, 2001).

Large portions of Area A are maintained as open fields. The proposed site of the NBACC Facility consists mostly of undeveloped grassland, parts of which are mowed weekly by a contractor (Boyland, 2002). Dominant field species in this area include alfalfa, tall fescue, bromegrass, crown-vetch, and bush-clover (USAG, 1998). Approximately 7.07 acres (307,969 $ft.^2$) of grassland may be disturbed by the construction of the proposed NBACC Facility.

4.7.2 WILDLIFE

The number of wildlife habitats on Fort Detrick is limited due to human activities and urbanization. Faunal assemblages are predominantly composed of species that are adapted to the living conditions in urban, suburban, and agricultural habitats; though some species typical

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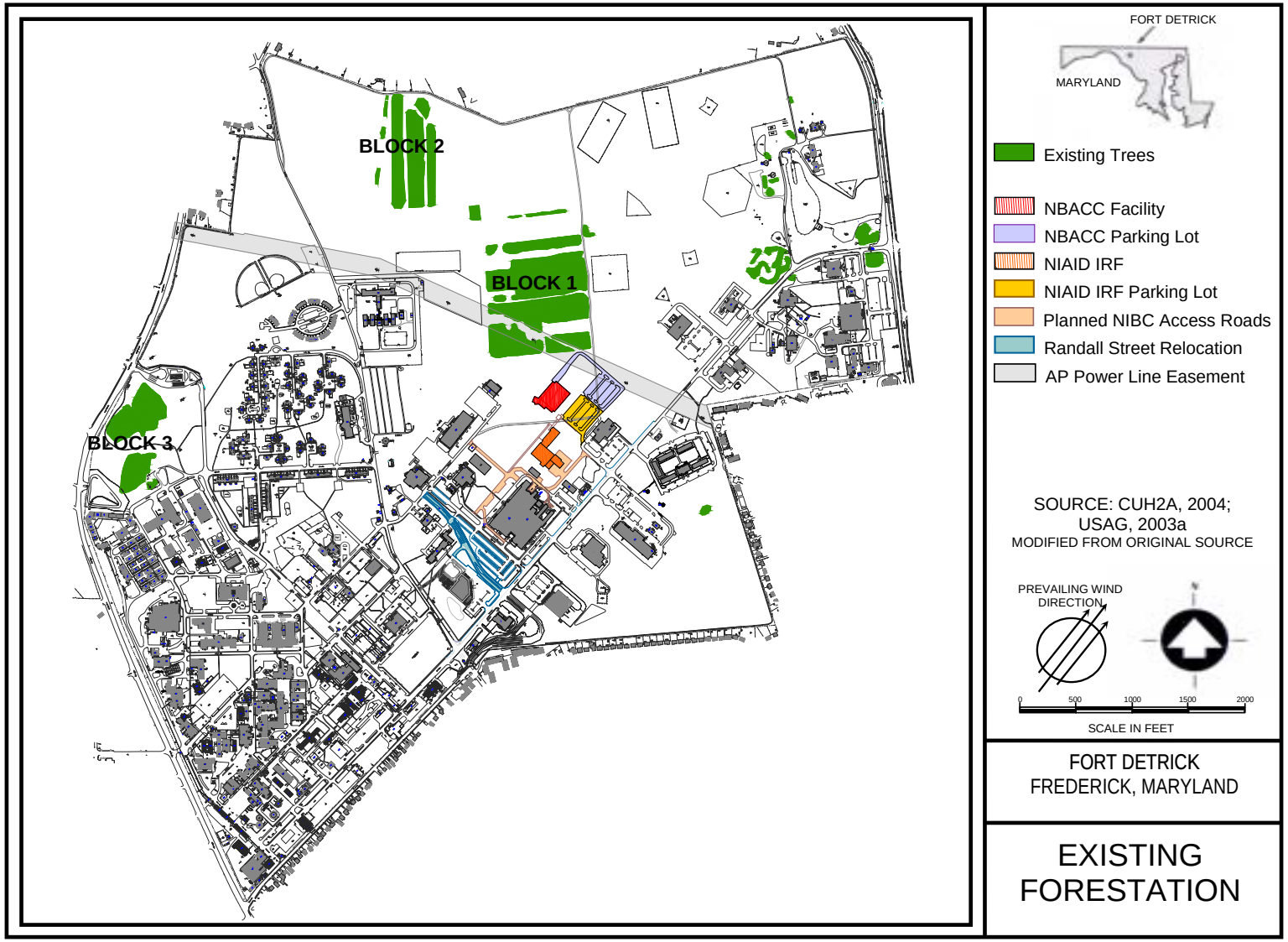

Figure 4–8. Forest Blocks in Area A.

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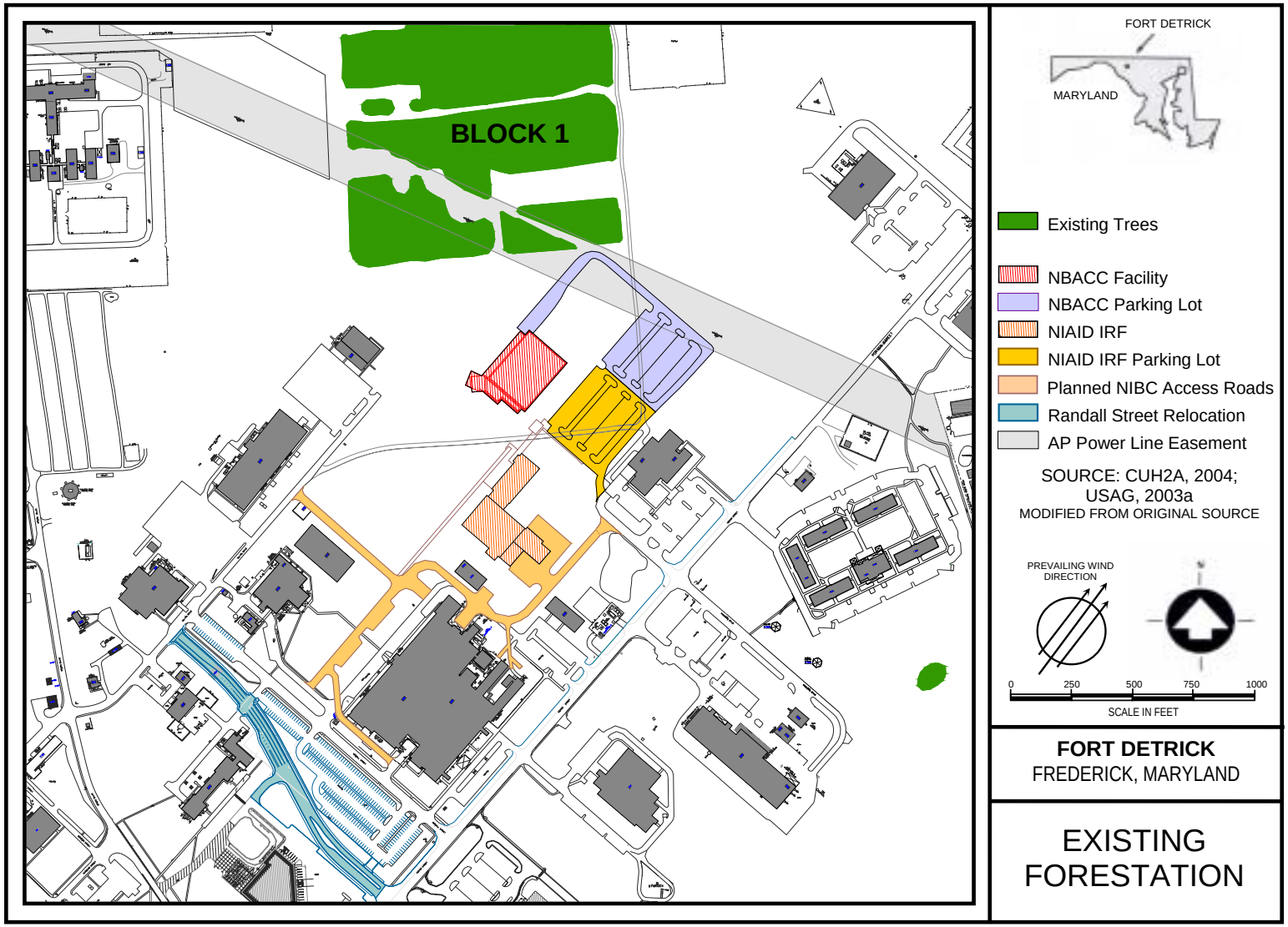

Figure 4–9. Forest Blocks Near the Proposed NBACC Facility Site.

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of the oak-hickory and northern hardwood forest associations are present in the forested areas of Fort Detrick (USAG, 2001).

4.7.2.1 Birds

Bird diversity on Fort Detrick is highly dependent on the availability of suitable, unfragmented avian habitats. The Installation encompasses a variety of ecosystems, including forests, riparian zones, and agricultural fields, that can serve as habitat for a potentially great variety of bird species both during the breeding season and during the winter months. In the past, 225 species of birds were observed in Frederick County (data from Christmas Bird Count compiled in USAG, 2001). An avian census of all forested habitats at Fort Detrick, which was conducted in June 1997, found 52 species of birds on Area A. Forest Block 1, which is the largest forest in Area A, contained 40 different species and was the most diverse habitat on Fort Detrick (USAG, 2001). Forest Block 1 is located immediately north of the proposed site of the NBACC Facility. The most common birds identified at Area A during the 1997 census were: the house wren (*Troglodytes aedon*; 49 occurrences), the northern cardinal (*Cardinalis cardinalis*; 43 occurrences), the American crow (*Corvus brachyrhynchos*; 34 occurrences), and the gray catbird (*Dumetella carolinensis*; 32 occurrences) (USAG, 2001).

4.7.2.2 Mammals

Fort Detrick lies in a geographic region that falls within the potential range of 57 mammal species (USAG, 2001). However, due to a lack of suitable habitats on the Installation, the actual number of mammal species that inhabit Fort Detrick is much smaller. A mammalian survey based on live trapping, scent station track counts, and direct observations was conducted in June of 1997 and recorded a total of 12 mammals for Fort Detrick. The following species were identified during the survey: white-tailed deer (*Odocoileus virginianus*), meadow vole (*Microtus pennsylvanicus*), eastern cottontail (*Sylvilugus floridanus*), gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), fox squirrel (*Sciurus niger*), woodchuck (*Marmota monax*), white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), opossum (*Didelphis virginiana*), raccoon (*Procyon Iotor*), and an unidentified species of bat. In addition, visual observations from resource management personnel suggest the presence of red foxes (*Vulpes vulpes*) on the Installation as well (USAG, 2001).

A separate small mammal survey was conducted in the spring of 2001 with the intention of gathering distribution data for shrew species, as well as data regarding any rare, threatened, and endangered species that may inhabit Fort Detrick. Three species were found during this survey, these being the meadow vole, the white-footed mouse, and the short-tailed shrew (*Blarina brevicauda*) (USAG, 2002b).

4.7.2.3 Fishes

The Monocacy River, Carroll Creek, and the Nallin Farm Pond are the three major bodies of water in the vicinity of Fort Detrick that support freshwater fisheries (see Section 4.5.1). The Nallin Farm Pond covers approximately 3.3 acres, approximately 2,603 ft. northeast of the proposed NBACC Facility site. A 1994 assessment of the pond concluded that there were nine species of fish present in Nallin Farm Pond. Largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), bluegill sunfish (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), green sunfish (*Lepomis cyanellus*), rainbow trout (*Oncorhynchus*

mykiss), yellow bullhead (*Ictalurus natalis*), golden shiner (*Notemigonus crysoleucas*), and carp (*Cyprinus carpio*) are the common species found in the pond (USAG, 2001). The stormwater retention pond, adjacent to Building 1434, is not a suitable habitat for a wide variety of aquatic species. The only known fish species in the pond are mosquito fish (*Gambusia affinis*), which were stocked to control mosquito larvae (Boyland, 2002).

Carroll Creek transects Area B of Fort Detrick and comes within approximately 300 ft. of the western boundary of Area A. This stream is designated as Use III-P (COMAR 26.08.02) by the State of Maryland, which indicates high water quality and the potential of the water body to support the growth and propagation of trout. Good water quality and the large variety of habitats found in the creek support a considerable variety of fish species including rosyside dace (*Clinostomus funduloides*), carp (*Cyprinus carpio*), blacknose dace (*Rhinichthys atratulus*), longnose dace (*Rhinichthys cataractae*), bluntnose minnow (*Pimephales notatus*), creek chub (*Semotilus atromaculatus*), pearl dace (*Margariscus margarita*), white sucker (*Catostomus commersoni*), yellow bullhead (*Ameiurus natalis*), redbreast sunfish (*Lepomis auritus*), bluegill sunfish (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), fantail darter (*Etheostoma bellare*), Potomac sculpin (*Cottus girurdi*), and rainbow trout (*Oncorhynchus mykiss*) (USAG, 2001).

The State of Maryland designated the Monocacy River as a Use IV-P (COMAR 26.08.02) warm water fishery. This designation is assigned to waters that can serve as recreational trout waters and public water supply. Water quality in a Use IV-P river must be high enough to support adult trout for put-and-take fishing. Fish populations are actively managed by periodic stocking and seasonal catching. Previous surveys identified at least 43 species of fish in the river. Common species in the middle segment of the Monocacy River include smallmouth bass (*Micropterus dolomieui*), black crappie (*Pomoxis nigromaculatus*), redbreast sunfish (*Lepomis auritus*), bluegill sunfish (*Lepomis macrochirus*), catfish (*Ictalurus sp.*), shorthead redhorse (*Moxostoma macrolepidotum*), white sucker (*Catostomus commersoni*), and various species of shiners and minnows, with small populations of white crappie (*Pomoxis annularis*) and brown trout (*Salmo trutta*) (USAG, 1998).

4.7.2.4 Herpetofauna

Fort Detrick lies within geographical range of 60 species of reptiles and amphibians. Area A has a small number of potentially suitable habitats for herptofauna; however, no formal herpetological survey has been conducted at the Installation. Incidental observations by personnel conducting the bird and mammal surveys in June 1997 and May 2001 suggest the presence of leopard frogs (*Rana pipiens*) and bull frogs (*Rana catesbeiana*), rough green snake (*Opheodrys aestivus*), as well as painted turtle (*Chrysemys picta*) on the Installation (USAG, 2002b; 2001).

4.7.3 SPECIAL STATUS SPECIES

The altered environment of Fort Detrick provides little high-quality habitat for most species of wildlife. There are no records for Federal- or State-listed rare, threatened, or endangered species of plants or animals within the boundaries of the Installation (USAG, 2001). A survey for rare, threatened, and endangered small mammals and a survey for rare, threatened, and endangered plants were prepared by the Maryland Natural Heritage Program of the MDNR in February 2002. Both surveys found no evidence of special status species on Fort Detrick.

However, the presence of such species on the Installation cannot be precluded with certainty. For example, the open areas and fields of the Installation may provide sufficient habitat for endangered or declining bird species including the Savannah sparrow (*Passerculus sandwichensis*), listed as declining populations in Maryland, as well as the loggerhead shrike (*Lanius ludovicianus*) and upland sandpiper (*Bartramia longicauda*), listed as endangered in Maryland (Slattery, 1997; USAG, 2001). The status of species may change over time as a result of changes in listing status for Federal and State threatened and endangered species and as a result of new surveys of the Installation (USAG, 2001). There are no known special status species on or near the proposed site of the NBACC Facility (Boyland, 2002).

4.8 AIR QUALITY

4.8.1 REGIONAL AIR QUALITY

Fort Detrick lies within the Central Maryland Air Quality Control Region (Area II). MDE's Air and Radiation Management Administration (ARMA) administers Federal and State air quality regulations statewide. Maryland has adopted USEPA National Ambient Air Quality Standards (NAAQS), as set forth under the CAA, to control a select group of widely occurring pollutants. These standards establish safe concentration levels for the six criteria pollutants: CO, Pb, NO_x, O_3, particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), and SO_2. Particulate matter is divided into two classes, coarse PM (PM_{10}), i.e., particles, and fine PM ($PM_{2.5}$), i.e., particles less than 2.5 microns in diameter (MDE, 2003b).

Under the CAA, an "attainment area" is defined as a geographic area where the level of a criteria air pollutant meets the primary or secondary NAAQS for the pollutant. A "nonattainment area" is a geographic area that has (or that contributes to) levels of a criteria air pollutant that are higher than allowed by the primary or secondary NAAQS. One single location may be in attainment for one pollutant and simultaneously have unacceptably high levels of another criteria air pollutant. The CAA requires that attainment areas implement a PSD plan to prevent degradation and to maintain attainment status. The 1990 CAA established five classification categories based on the severity of nonattainment and set new deadlines for each category to achieve attainment. The five categories are extreme, severe, serious, moderate, and marginal. One of the goals of the CAA is to set attainable goals/deadlines for air quality control regions to reach attainment status.

As of May 2003, all of Maryland, including the Frederick region, was in attainment for all NAAQS criteria pollutants except for O_3 (MDE, 2003c). On 15 April 2004, USEPA officially designated Frederick County as being in an ozone nonattainment area (i.e., Washington, DC-MD-VA) with a classification of "moderate." This designation and classification took effect on 15 June 2004, and state, tribal, and local governments must now prepare plans, known as implementation plans, that describe their efforts to reduce ground-level ozone to meet the 8-hour ozone national air quality standard. By law, nonattainment areas may be subject to certain requirements to reduce ozone-forming pollution (e.g., NO_x and VOCs). States with designated nonattainment areas must submit plans for achieving the 8-hour ozone standard by April 2007; and, specifically, the deadline for achieving clean air (i.e., the maximum attainment date) for the Washington, DC-MD-VA nonattainment area is June 2010. Additionally, Fort Detrick is still located in a designated ozone nonattainment area with a classification of "severe" based on the original 1-hour ozone standard. USEPA will revoke the 1-hour standard one year after the

effective date of designating attainment and nonattainment areas for the 8-hour standard (USEPA, 2004).

USEPA recently began implementing the 8-hour ozone standard based on information demonstrating that the 1-hour standard was inadequate for protecting public health. Scientific information shows that ozone can affect human health at lower levels and over longer exposure times than one hour. Ground-level ozone forms when emissions of NO_x and VOCs are heated by the sun. Sources of these pollutants include cars and trucks, power plants, refineries, and other large industrial facilities. The 8-hour ozone standard is 0.08 ppm, averaged over eight hours. The 1-hour standard is 0.12 ppm, measured in hourly readings (USEPA, 2004). The air quality monitoring station at the Frederick County Health Department, approximately 0.5 mile west of Area A, has been monitoring O_3 levels since 1995. During the seven-year time period of 1995 through 2001, the station reported levels exceeding the 1-hour standard only twice, on 14 September 1998 and on 16 July 1999 (MDE, 2003d).

4.8.2 FORT DETRICK AIR POLLUTION SOURCES

The main stationary sources of air pollution at Fort Detrick are boilers, incinerators, and emergency diesel generators. Commuter and on-site traffic constitute the mobile sources of air pollution at the Installation (USAG, 2003a). According to Title V of the CAA, a stationary source is considered a “major source” of air pollution if its actual emissions exceed the regional threshold levels for regulated air pollutants. Regulated pollutants are the criteria air pollutants or their precursors (e.g., VOCs or NO_x as precursors to O_3), hazardous air pollutants (HAPs) as specified in Title III of the CAA, toxic air pollutants (TAPs) as specified in COMAR 26.11.15, and Class I and Class II O_3 depleting substances (ODS) as specified in Title V of the CAA. Potential emissions are those that would be emitted assuming a maximum operating schedule of 24 hours per day, 365 days per year, at the unit’s maximum capacity. By definition, potential emissions are equal to or greater than actual emissions. The threshold levels for a Title V major source located in Frederick County are:

- 100 tpy of CO
- 100 tpy of Pb
- 100 tpy of SO_2
- 25 tpy of NO_x
- 100 tpy of PM_{10}
- 25 tpy of VOCs
- 10 tpy of any one HAP or 25 tpy of any combination of HAPs

For permitting purposes, a group of stationary sources that lie within a contiguous area under common control, as is the case on Fort Detrick, are treated as a single stationary source. Title V of the CAA requires all “major sources” of criteria air pollutants or their precursors to file a Part 70 application for an operating permit. A Title V Part 70 permit application must be submitted to MDE for facilities located in Frederick County with emissions that exceed the threshold levels listed above. Fort Detrick exceeds the threshold levels for actual emissions of NO_x and SO_2 (25 tpy and 100 tpy, respectively). Fort Detrick submitted a Title V Part 71 (Federal program) permit application to the USEPA on 03 June 2002 (Wolf, 2002b). However, USEPA delegated implementation of the Part 71 Federal program to MDE (MDE, ARMA, 2002). Thus, Fort Detrick’s Title V Part 70 Operating Permit (No. 24-021-00131) was issued by MDE ARMA on 01 April 2004. The Title V Part 70 Operating Permit expires on 31 March 2009 (Wolf, 2004a).

Fort Detrick is ranked as the third largest source of NO_x in Frederick County (see Table 4-4). The majority of the Installation’s NO_x emissions originate from the central boiler plant,

incinerators, and generators (Wolf, 2003a). Summaries of Fort Detrick's actual annual criteria air pollutant emissions from stationary sources in 2002 and 2003 are presented in Table 4-5 and Table 4-6, respectively (Wolf, 2004b; 2003a). Existing laboratory facilities at Fort Detrick do not contribute significantly to the emission of criteria air pollutants from the Installation. Indirect contributions to the emission of criteria air pollutants (due to steam generated by the boilers for the laboratories and incineration of wastes generated at the laboratories) are minor.

Table 4-4. Major Air Pollutant Emissions Sources in Frederick County, Maryland in 2002.

Major Source	VOC (tpy)	NO_x (tpy)	HAPS (tpy)	PM or TSP (tpy)	SO_x (tpy)	CO (tpy)
EASTALCO-Frederick	74	71	402	371	3,234	21,906
ESSROC Materials, Inc.	6	1,635	10	164	1,138	104
Lehigh Cement-Woodsboro	1	172	0	240	2,297	59
Fort Detrick	3	90	0	30	280	29
Redland Brick-Rocky Ridge Plant	1	9	5	6	1	32
Canam Steel	138	5	0	2	0	0
Reichs Ford Sanitary Landfill	3	6	0	0	2	6
George Weston Bakeries	48	3	0	0	0	3

Source: MDE, ARMA, 2004.

Table 4-5. Actual Criteria Air Pollutant Emissions at Fort Detrick in 2002.

Pollutant	Boilers (Heaters)	Incinerators	Diesel Generators	Tanks	Surface Coating Operations	Total (tons)
CO	27.05	0.26	1.59	0	0	28.87
NO_x	80.11	3.44	6.02	0	0	89.57
PM_{10}	19.12	10.69	0.11	0	0	29.92
SO_2	276.42	2.78	0.10	0	0	279.3
VOCs	2.08	0.15	0.15	0.74	0	3.12

Source: Wolf, 2003a.

Table 4-6. Actual Criteria Air Pollutant Emissions at Fort Detrick in 2003.

Pollutant	Boilers (Heaters)	Incinerators	Diesel Generators	Tanks	Surface Coating Operations	Total (tons)
CO	19.15	1.70	3.53	0	0	24.38
NO_x	113.83	8.06	13.28	0	0	135.2
PM_{10}	33.48	12.72	0.24	0	0	46.44
SO_2	640.3	3.74	2.10	0	0	646.1
VOCs	1.66	0.23	0.34	0.98	0	3.21

Source: Wolf, 2004b.

4.8.3 HAZARDOUS AND TOXIC AIR POLLUTANTS

HAPs, also known as TAPs in COMAR 26.11.16, are compounds that pose serious health hazards, such as cancer causing substances or mutagens that may cause birth defects. The USEPA controls 188 HAPs, as listed in Title I of the CAA, and the State of Maryland has established a complementing, more stringent emission standards program regulating all Title I HAPs and additional TAPs.

The Fort Detrick Air Program Manager recently calculated actual HAP emissions from Fort Detrick, including MDE TAPs. HAP emissions were evaluated considering all sources of emission, including those that are fugitive (e.g., gasoline storage tanks). In 2002, Fort Detrick generated a total of 0.0427 tons of HAPs. The primary sources of HAP emissions on the Installation are the boilers and fuel storage and dispensing activities (Wolf, 2003a). Existing biomedical research facilities at Fort Detrick do not contribute significantly to overall HAP or TAP emissions on the Installation. The USAG emission inventories indicate that Fort Detrick is not required to meet emission control requirements for HAPs or TAPs because emissions are not more than 10 tpy for any single TAP, or not more than 25 tpy for any combination of TAPs (Wolf, 2003a).

4.9 HISTORICAL AND CULTURAL RESOURCES

4.9.1 REGIONAL AND INSTALLATION HISTORY

Settlement of the Frederick County area began during the early 1700s. The town of Frederick was chartered in 1735 and the County was created on 11 June 1748 by the Maryland Provincial Assembly. This region of the State of Maryland was important in many events throughout the history of the United States, including the French and Indian War, the Revolutionary War, and the Civil War (USACE, 2000b).

In 1929, Frederick County opened a small municipal airfield on 90 acres of land north of the City of Frederick. The airfield was leased to the Maryland National Guard in 1931 for a summer training camp. The field was named Detrick Field in honor of Major Frederick Lewis Detrick, a Frederick native and World War I (WWI) veteran. The Army Air Corps leased the property to train its military pilots in 1940 and abandoned the airfield after mobilization for WWII began. In 1941, President Roosevelt established the U.S. Biological Warfare Program, and in 1943, the Army Chemical Warfare Service purchased Detrick Field from the City of Frederick. The Camp Detrick Biological Warfare Research Center was established for the research and development of biological warfare techniques and agents for offensive and defensive purposes. By 1945, Camp Detrick consisted of 245 buildings, including housing for 5,000 workers. Less than 100 of those buildings remain (USACE, 2000b).

Camp Detrick was designated a permanent installation for biological research and development shortly after WWII. In 1956, Camp Detrick was formally designated as “Fort Detrick” following the purchase of Area C (the water and wastewater treatment plants) and Area B (the outdoor testing area) in 1944 and additional portions of Area A (previously farmland) between 1946 and 1952. Following the discontinuation of the offensive biological warfare research program in 1969, former biological research facilities were converted to house biomedical research activities or administrative offices. In 1972, the NCI-Frederick arrived at Fort Detrick and brought with it a new mission that focused on cancer research (Covert, 2000).

4.9.2 HISTORICAL RESOURCES

The DA must protect prehistoric and historic cultural resources on DA property according to the National Historic Preservation Act (NHPA) and other Federal laws and regulations. In accordance with AR 200-4, *Cultural Resources Management*, Fort Detrick maintains an Integrated Cultural Resource Management Plan (ICRMP) that serves as a guide for compliance with the NHPA of 1966 and other applicable Federal laws and regulations (USACE, 2000b). Based on an inventory and evaluation of all Installation structures constructed prior to 1946 (USACE, 2000b; USACE, 1992), four structures on Area A are currently listed in the NRHP and several sites are eligible for a listing in the NRHP.

4.9.2.1 Current NRHP-Listed Sites

Three of the four NRHP-listed sites on Area A are located in the Nallin Farm Complex at the northeast corner of Area A, approximately 3,000 ft. northeast of proposed NBACC Facility site. The Nallin Farm House (Building 1652) and its associated bank barn (Building 1655) and springhouse (Building 1661) are listed in the NRHP for their local significance in 19th century architecture and agriculture. The Nallin Farm House was constructed circa 1830 during the Agricultural-Industrial Transition Period (1815-1870) and possesses characteristics of both, a typical regional farmhouse and Federal architecture (USACE, 2000b; Goodwin and Associates, 2002). The Federal architectural features of the Nallin Farm House include the rectangular-shaped, two-story house with sash windows and a low-pitched gable or hip roof. The house has a balanced composition with minimal projections. Classical, delicate ornamentation decorates the exterior of the house (Goodwin and Associates, 2002). The Nallin Spring House and the Bank Barn are representative of a construction period that dates before 1798. The Spring House is of fieldstone construction and is characterized by high walls and a wood-shingled roof. The Bank Barn exemplifies the typical characteristics of local Piedmont stone and timber construction of the late-18th century (Maryland Historical Trust, 2003). The entire Nallin Farm Complex is being considered for designation as a historic district (USACE, 1997).

The One-Million-Liter Test Sphere (Building 527) is listed in the NRHP for its national significance in the scientific development of aerobiology and for its unique structural engineering. The facility consists of a 40-foot diameter, gas-tight, steel sphere that was used for aerobiological studies of pathogenic agents from 1951 to 1970 (Maryland Historical Trust, 2003). The One-Million-Liter Test Sphere is located on the NCI-Frederick campus, approximately 3,000 ft. southwest of the proposed site of the NBACC Facility.

4.9.2.2 NRHP-Eligible Sites

The following properties on Area A have been determined eligible for listing in the NRHP: Buildings 190, 375, 1301, 1302, 1303-06, 1412, 1414, 1415, 1653, 1656, and the tarmac. Building 190 (Boiler Plant) was constructed in 1952 by the Army to supply steam heat to Fort Detrick facilities. Building 190 is an important component of the mechanical infrastructure at Fort Detrick (USACE, 2000b). This building is located in the southwestern corner of Area A, south of Miller Street, and approximately 4,300 ft. southwest of the proposed site of the NBACC Facility.

Building 375 (Steam Sterilization Plant) was constructed by the Army in 1953 and continues to function as the central steam sterilization and decontamination plant, an important component of the Installation's infrastructure (USACE, 2000b). The building is an irregular-shaped brick

building designed for utilitarian purposes. The building is connected to the NCI-Frederick property through a series of elevated steam pipes that extend through the building's roof (USACE, 2000b). Building 375 is located at the western boundary of Area A, approximately 4,200 ft. southwest of the proposed site of the NBACC Facility.

Buildings 1301 through 1306 were constructed in 1956 to support research and testing by the Crops Research Division (USACE, 2000b). Research was aimed at developing more robust and productive crops, but research was also conducted to evaluate impacts of biological and chemical warfare agents on plants and crops. Building 1301, a large, two-story brick building, and Building 1302, a one-story wing extending from the rear of Building 1301, continue their original function as research laboratories (USACE, 2000b). The USDA currently leases both Buildings 1301 and 1302. Buildings 1303 through 1306 are greenhouses located behind Buildings 1301 and 1302, which are also used by the USDA for its ongoing research programs. This building complex is located in the central portion of Area A, approximately 1,400 ft. northwest of the proposed site of the NBACC Facility.

Buildings 1412 and 1414 were declared eligible for listing in the NRHP in 2001 (USAMRMC, 2001). Building 1412, constructed in 1958, was a special operations building designed specifically to support biological warfare research during the Cold War era. Building 1414 was an exhaust air incinerator sterilization building associated with Building 1412 (USAMRMC, 2001). Building 1412 is constructed with cinder block walls and relieved by concrete pillars. This building is still used as a laboratory with upgraded modern equipment (USACE, 2000b). Building 1415, a square one-story brick building, was built in 1959 as a guard shack, and it is currently used for administrative purposes as a Union office (USACE, 2000b). This group of buildings is considered exceptionally significant as physical examples of the Army's Cold War policies, illustrating that aspect of American Military History (USAMRMC, 2001). These buildings are located approximately 840 ft. southwest of the proposed site of the NBACC Facility.

Building 1653 was previously used as the garage associated with the Nallin Farm House. Currently, it is used by the military for storage purposes. Building 1656, the Dairy Barn, is located near the Bank Barn on the Nallin Farm Complex. It is now used by USAMRIID for storage purposes. Both of these buildings were determined eligible for listing in the NRHP in 1992 (USACE, 2000a).

The "tarmac" (actually composed of concrete) was a portion of an airfield in the southwestern portion of Area A, prior to the establishment of Fort Detrick. In 1929, the City of Frederick established a municipal airport and, later that year, leased the property to the U.S. Government as an emergency landing field (National Cancer Institute [NCI] and USAG, 2003). It became a permanent training field for the Maryland National Guard in 1931 and was named Detrick Field. Beginning in 1939, the Federal government built a large hanger (now Building 201) and a series of wooden prefabricated barracks and administrative buildings, many of which still remain. A concrete tarmac was constructed from Building 201, and it is now known as Hamilton Street. The tarmac runs from west to east and terminates on Schertz Street. A grass runway extended from the tarmac from west to east and traversed the current parade grounds in front of Building 810. The last airplanes left Detrick Field in early 1942 (Covert, 2000). Building 201 is located in the southwest corner of Area A, approximately 4,900 ft. southwest of the proposed NBACC Facility site. Schertz Street, the endpoint for the tarmac, is located approximately 3,900 ft. from the proposed NBACC Facility site.

4.9.3 ARCHEOLOGICAL RESOURCES

Fort Detrick is located in the Monocacy River Drainage Basin of the Piedmont Physiographic Province, which is part of Maryland Archeological Unit 17. The 1992 Cultural Resources Management Plan (CRMP) for the Installation determined that approximately 625 acres in Areas A, B, and C might have high potential for archeological resources (USACE, 1992). A Phase I Archeological Survey was performed at Fort Detrick from October 1992 through January 1993 (Goodwin and Associates, 1993). Of the 625 acres of land investigated during the Phase I study, a total of eight archeological sites were identified and/or examined. Five of these sites were located on Area A (see Figure 4–10).

One of the five archeological sites on Area A, the Nallin Farm Site (18FR684), which is located between Building 1652 and Building 1654, has been identified as a significant archeological site. The Wide Pastures Farm Site (18FR685), located approximately 3,100 ft. west of the proposed NBACC Facility site, was subjected to further investigation through a Phase II Archeological Survey; however, it was deemed ineligible as a significant archeological site by the Maryland Historical Trust (Goodwin and Associates, 2003). Historic Site 18FR681 is located approximately 290 ft. south of the proposed NBACC Facility site (see Figure 4–11). Historic Site 18FR680 is located east of Building 1425 at Porter Street, approximately 1,100 ft. south of the proposed NBACC Facility site (see Figure 4–11). These two sites (18FR681 and 18FR680) did not warrant further evaluation because they lacked integrity and archeological research potential (Goodwin and Associates, 1993).

The Stonewall Jackson Beall Site (18FR683) is located west of Building 1422 at Ditto Avenue, approximately 1,400 ft. southwest of the proposed NBACC Facility site (see Figure 4–11). This site yielded 19th century artifacts and one piece of pearlware dated between 1780 and 1830. In addition, remnants of historic activity were found in the adjacent yard. Although the Beall House (Building 1401) is no longer considered to have historic value due to the many renovations made to the structure, the area adjacent to the Beall House may retain archeological integrity and research potential (Goodwin and Associates, 1993).

The Nallin Farm Site (18FR684) encompasses an area of 40 meters (m) x 40 m within the Nallin Farm Complex. This archeological site is located between Building 1652 and Building 1654, approximately 3,200 ft. northeast of the proposed NBACC Facility site. Artifacts dating from the 18th and 19th centuries have been recovered from the yard. The presence of materials dated prior to the construction of the farm complex may indicate that a previous establishment was present on the site (Goodwin and Associates, 1993). A Phase II Archeological Survey conducted for this site concluded that the Nallin Farm Site is eligible for inclusion in the NRHP. As stated in Section 4.9.2.1, the entire Nallin Farm Complex is being considered for designation as a historic district (USACE, 1997).

The Wide Pastures Farm Site (18FR685) is situated on a small hill partially contained within Forest Block 3. The site encompasses an area of 45 m x 91 m and was developed with a late-19th/early-20th century revival-style mansion and a Carriage House. The principal structure was the residence for post commanders until it was demolished for safety reasons in 1977. The Carriage House (Building 1001) was demolished in 2000 (Boyland, 2003b). A Phase I Archeological Survey recovered 19th and 20th century artifacts from the area and recommended formal evaluation of the site (Goodwin and Associates, 1993). A Phase II Archeological Survey of the Wide Pastures Site was conducted in 2002. Although the landscape was determined to

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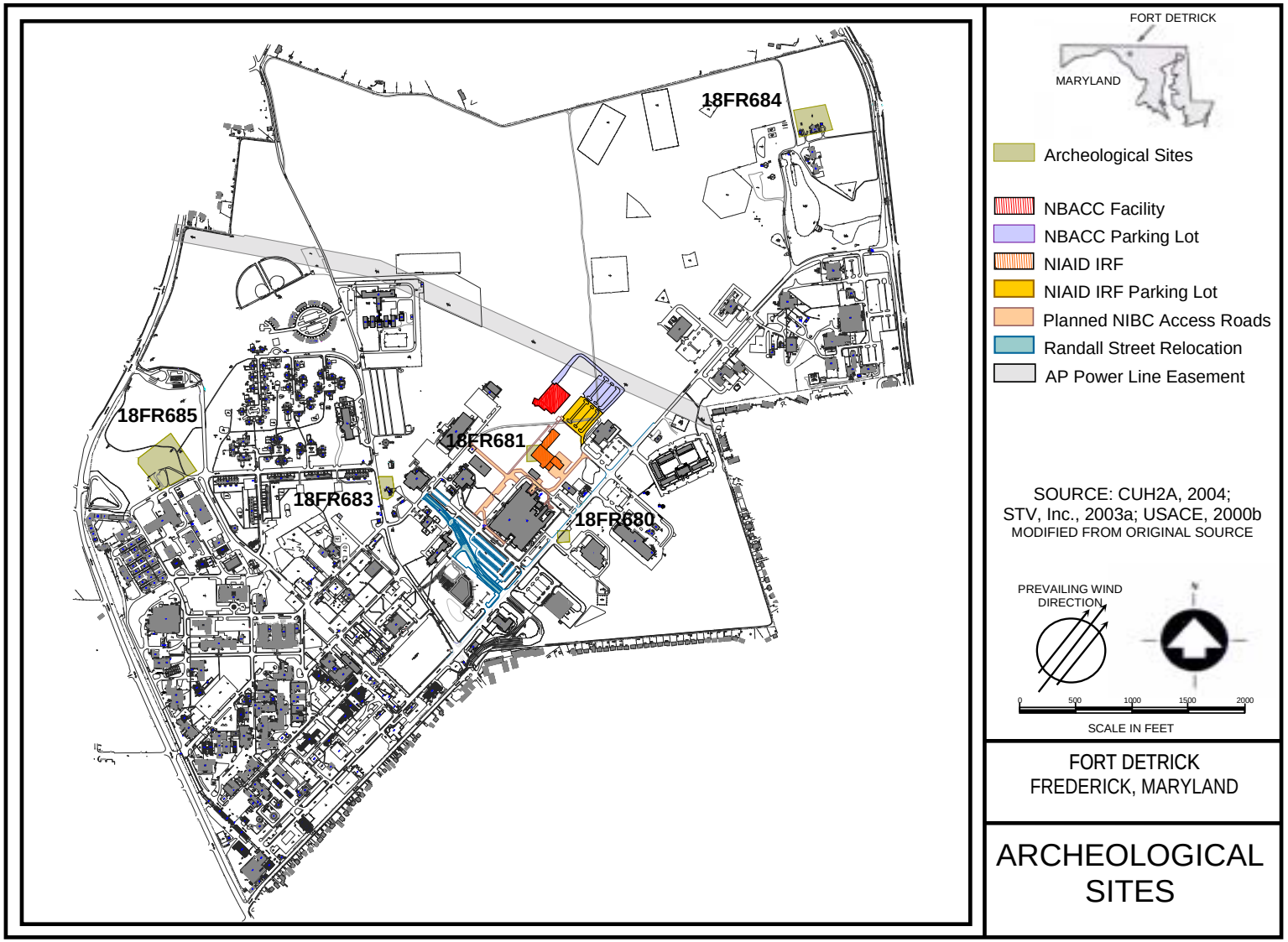

Figure 4–10. Archeological Sites in Area A.

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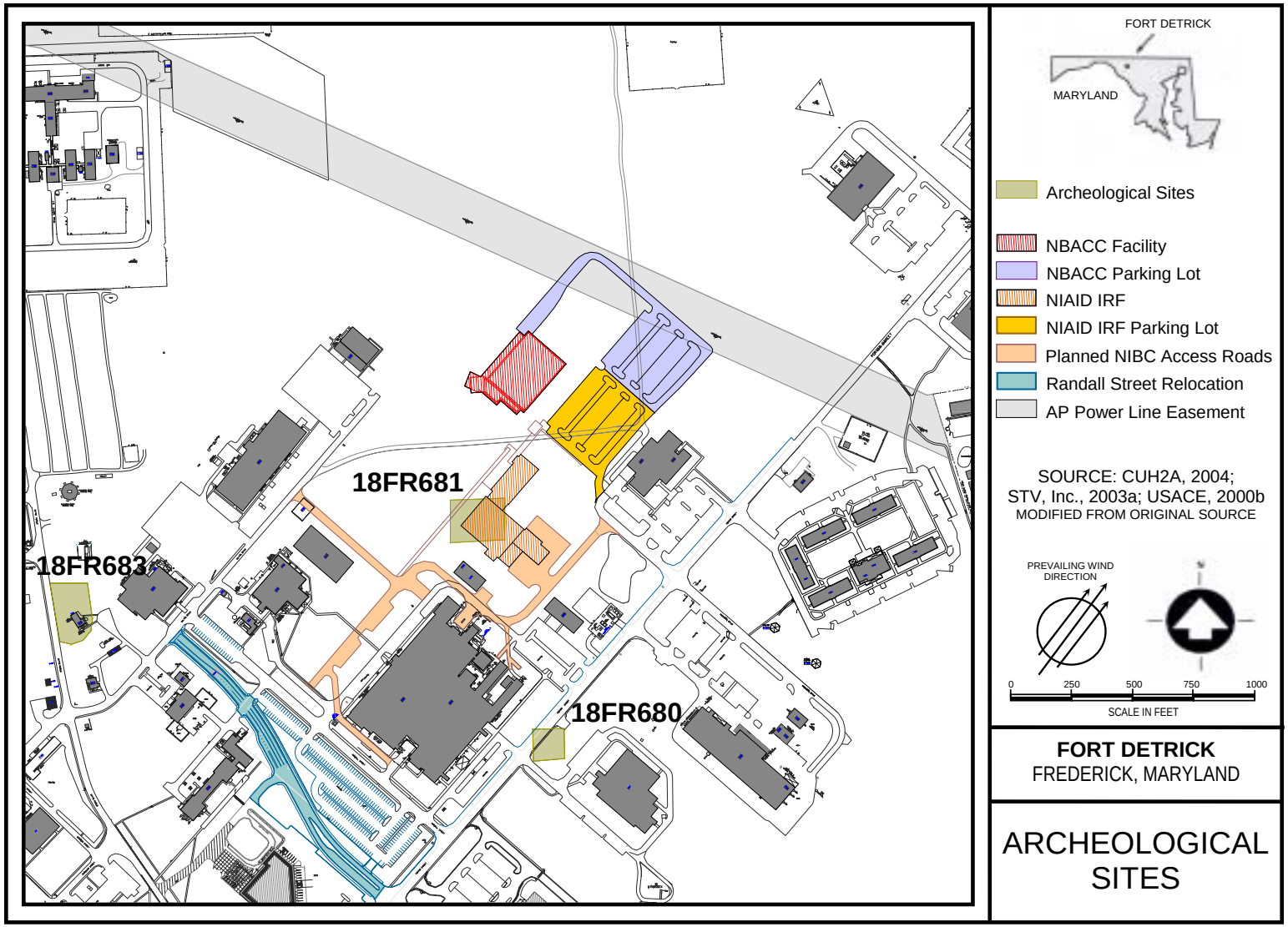

Figure 4–11. Archeological Sites Near the Proposed NBACC Facility Site.

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adhere to the National Register's integrity requirements, the Maryland Historical Trust deemed the Wide Pastures Farm Site ineligible for listing in the NRHP. This decision was based on the removal of the estate and carriage house and the significant assemblage of 19th and 20th century materials, which "does not add materially to our knowledge of rural upper class life ways either locally or regionally" (Goodwin and Associates, 2003). No further work on this site is deemed necessary.

Of the two archeological sites that were deemed ineligible for further evaluation, one of these sites (18FR681) is located approximately 287 ft. south of the proposed site of the NBACC Facility. This site encompasses an area of approximately 20 m x 70 m. The investigation uncovered scattered cultural materials including domestic artifacts (e.g., kitchen and clothing artifacts), 18th century stoneware, 18th and 19th century creamware and pearlware, and 19th century whiteware and machine-cut nails. These artifacts were found in disturbed soils, and the intensive subsurface testing failed to locate any cultural features, intact artifact-bearing strata, or concentrations of artifacts. It is believed that the artifacts were from a secondary deposit of refuse originating from 19th century structures that were once located in this particular area. Because systematic shovel testing confirmed that the site had been disturbed (i.e., site is confined to the disturbed modern plowzone), it was determined that this site lacked integrity and archeological research potential and did not warrant further evaluation (Goodwin and Associates, 1993).

4.10 SOCIOECONOMIC ENVIRONMENT

4.10.1 DEMOGRAPHICS

Fort Detrick is located in the City of Frederick, Frederick County, Maryland. The population of Frederick County was 195,277 in 2000, a 30 percent increase from 1990 (U.S. Census Bureau, 2002). Growth projections predict that the population will reach more than 238,700 by the year 2010 and 282,100 by the year 2020 (Maryland State Data Center, 2003a). Frederick County's population growth is fueled by competitive home prices, ample developable land, and its proximity to the region's key governmental, technological, and biomedical economic assets (Business Wire, 2004). The City of Frederick contains approximately 27 percent of the County's total population with a total of 52,767 residents (City of Frederick Planning Department, 2002).

According to 2000 census data, the population of Frederick County is 89.3 percent Caucasian, 6.4 percent African-American, 2.4 percent Hispanic, 1.7 percent Asian, 0.2 percent American Indian and Alaska Native, and 0.9 percent reported as some other race (U.S. Census Bureau, 2002). Census block group 7507-3 is a statistical area roughly defined by Fort Detrick on the north and west, Seventh Street on the southwest, Taney Avenue on the southeast, and Opossumtown Pike on the east. The population of this census block group in 2000 was 74.2 percent Caucasian, 19.0 percent African-American, 2.5 percent Hispanic, 2.8 percent Asian, 1.2 percent Native American, and 0.3 other reported races (U.S. Census Bureau, 2002).

The U.S. Census Bureau defines the poverty level as the income level; based on family size, age of householder, and the number of children less than 18 years of age; that is considered too low to meet essential living requirements without regard for the local cost of living. According to 2000 census data, 7.4 percent of all persons within the City of Frederick were living below the poverty level in 1999 (U.S. Census Bureau, 2002). Within census block group 7507-3, as described above, 15.8 percent of all persons were living below the poverty level in 1999 (U.S.

Census Bureau, 2004). A "poverty area" is defined by the U.S. Census Bureau as an area in which at least 20 percent of the population lives below the poverty level. Therefore, the City of Frederick is not considered to be a low-income community.

The average monthly civilian labor force for Frederick County in 2002 was 108,836, of which an average of 105,659 were employed. The 2002 annual average unemployment rate in Frederick County was 2.9 percent, well below the state and national averages (Maryland Department of Labor, 2003). With 7,107 employees, Fort Detrick is the largest employer in Frederick County. Approximately 20 percent of the total labor force at the Installation is enlisted personnel (DoD, 2002). The NBACC Facility would create an additional estimated 120 jobs at the Installation.

The service industry is the largest employment sector in Frederick County, comprising approximately 30 percent of all jobs in the County. The next largest sectors are retail (22.4 percent), government (13.2 percent), and construction (10.8 percent) (see Table 4-7; Frederick County Office of Economic Development, 2002). The estimated 2002 median household income for Frederick County was $68,200, which is more than $9,000 above the state average of $58,600 (Goldstein, 2003). In 2004, Frederick County received an economic Fitch Rating of "AA+" which "reflects Frederick County's ability to maintain a strong financial position and moderate debt levels, while effectively managing significant growth" (Business Wire, 2004).

Table 4-7. Employment Categories of Frederick County Residents (2000).

Industrial Classification	Percent of Residents
Services	30.8
Wholesale and Retail Trade	22.4
Government	13.2
Construction	10.8
Finance, Insurance and Real Estate	8.9
Manufacturing	7.5
Transportation and Utilities	2.8
Agricultural	1.7
Other	1.9

Source: Frederick County Office of Economic Development, 2002.

4.10.2 HOUSING

As of March 2000, Frederick County had 74,300 housing units. This reflected an average increase of 2,000 dwelling units/yr throughout the 1990s (Frederick County Department of Planning and Zoning, 2000). Construction of new housing has slowed somewhat in recent years. In 2002, 1,364 new buildings, comprising 1,578 housing units, were authorized in Frederick County. Of these housing units, only 14 were authorized for the City of Frederick (Maryland State Data Center, 2003b).

Of the average 1,242 active duty personnel assigned to Fort Detrick in FY01, 356 were living on the Installation. The number of family members accompanying these personnel was 2,502 (Canny, 2002). More than 71 percent of the active duty personnel at Fort Detrick live off-post. Transient personnel facilities include 5 family lodging quarters, 16 visiting officers' quarters, and one distinguished visitor apartment. Fort Detrick offers a limited amount of on-Installation

housing for its military personnel. Of the 191 existing family housing units occupied by service members and their dependants, 125 units are designated for enlisted personnel and 30 units consisting of 2, 3, or 4 bedrooms are for officers. Among these 30 units are 4 units for high-ranking officers (Buildings 800-802 and 1652) and 26 units (Buildings 1867-1879). The remaining 161 units consist of housing for Junior Noncommissioned Officer (NCO), Senior NCO, Colonel, and Colonel/Warrant Officers. These units have a 99 percent occupancy rate. Waiting lists for family housing units range from 8 to 26 months. On average, 130 officers and enlisted personnel are on the waiting list for on-post housing (Fort Detrick Standard, 2003).

On-post UEPH consists of one 3-story barrack containing approximately 56 units (Building 1430) and five 48-unit barracks (Buildings 1533, 1534, 1535, 1536, and 1538) (Federline, 2003). Occupancy rates for these units range from 75 percent to 88 percent (Cole, 2003). Building 1430, currently used for UEPH space, will become available for renovation following completion of the barracks complex located in the southern area of Fort Detrick (STV, Inc., 2002). The proposed conversion and renovation of Building 1430 will make administrative space available to U.S. Army Medical Research Acquisition Activity (USAMRAA) and U.S. Army Medical Materiel Development Activity (USAMMDA) (STV, Inc., 2002).

The DoD selected the Installation for the Residential Communities Initiative (RCI), a public-private partnership program in which private development capital and expertise is combined with existing Army land, housing assets, and the income stream from military renters to quickly build additional housing or renovate existing housing without using appropriated tax dollars (USAG, 2002c). On 01 July 2004, the existing 191 family housing units were conveyed to the Development Entity along with a 50-year land lease of up to 117 acres through the RCI (Craig, 2004; USACE, 2003). An additional 161 housing units under the RCI are planned for construction on Area A (Bennett, 2003a; USACE, 2003).

4.11 NOISE

Fort Detrick is considered a relatively quiet environment with no significant noise pollution sources on the Installation. Minor sources of noise at Fort Detrick include the boiler plant, the generator facilities in Buildings 1673 and 1677, vehicular traffic, and the carpenter shop in Building 199. Surveys are conducted periodically to identify operations that expose workers to potentially harmful noise levels. Employees who work in areas with potentially harmful noise levels are enrolled in the Army's Hearing Conservation Program. The bugle and cannon are exercised Monday through Friday at 5:00 p.m. Based on measurements of noise performed on the Installation, the noise generated from operations is compatible with residential use (USAG, 2003a). In addition, noise is generated from current construction activities within Fort Detrick.

4.12 ODORS

Odors emanating from Fort Detrick originate primarily from the boiler plant (Building 190), the incinerator complex (Building 393), and certain routine operations conducted at the Installation. Operation of the boiler plant for process steam production and comfort heating purposes can create odorous byproducts. The boilers burn natural gas as a primary fuel and No. 6 fuel oil as a backup fuel (20 percent) during normal operations. However, during 2001-2003, natural gas tripled in price, which led to increased use of No. 6 fuel oil to as much as 60-70 percent. At 2003 prices of $6.30/MMBtu for natural gas and $0.48/gal ($3.20/MMBtu) for No. 6 fuel oil, use of natural gas would not be cost effective. If natural gas prices decline, use of No. 6 fuel oil, and

therefore potential odors due to boiler plant operation, will decrease accordingly (Spears, 2003; Warner, 2003).

The incinerator complex at Fort Detrick includes two municipal waste incinerators and two medical waste incinerators, as discussed in Section 2.3.3. The municipal waste incinerators are used to reduce the volume of municipal waste load disposed of in the Fort Detrick Municipal Landfill and also to generate steam, which reduces the load on the boiler plant. Operation of the incinerators includes the required emission control equipment. Stack emissions from the boiler plant and/or the incinerator complex have been observed on rare occasion, at ground level, when thermal temperature inversions occur in damp environments associated with the early morning hours. These facilities were designed to meet all the requirements for stack height to provide adequate dispersion of stack emissions under normal atmospheric conditions.

Transient offensive odors may result from autoclave and incineration processes; however, these are typically localized and rapidly dispersed in the ambient atmosphere. Steam sterilization processes at the NCI-Frederick Animal Production Area (Buildings 1021 through 1039 and Buildings 1044 through 1049), USAMRIID laboratories (Buildings 1412 and 1425), and the SSP (Building 375) have resulted in odorous emissions. In 1989, an investigation into the likely cause of odors emanating from these facilities determined that the odors resulted from the degradation of protein-containing substances, such as animal feed materials (NCI-Frederick Animal Production Area), microorganisms (USAMRIID), and effluent discharges (SSP) (Brinjac, Kambic, and Associates, 1989; DA, 1991). The proposed site of the NBACC Facility is located far to the east of the NCI-Frederick Animal Production Facility (approximately 3,674 ft.) and the SSP (approximately 4,142 ft.). The proposed NBACC Facility site is located north of USAMRIID facilities, approximately 660 ft. from Building 1425, approximately 846 ft. from Building 1412, and approximately 696 ft. from Building 1408 (currently under construction).

Other objectionable odors are produced during certain routine Installation operations. Petroleum odors occur during the transfer of fuel from the main delivery tank to smaller boiler plant tanks, which occurs as often as six times per day. Garbage odors arise during the transport of municipal solid waste (Greenwood, 2001). Citizen complaints regarding objectionable odors originating from Fort Detrick have occurred only rarely. Most of these complaints were attributed to odors originating from the NCI-Frederick Animal Production Area (Covert, 1996).

4.13 TRANSPORTATION

4.13.1 ACCESS TO FORT DETRICK

Fort Detrick is located in the northwestern portion of Frederick, Maryland, approximately 45 miles north of Washington, DC and 45 miles west-northwest of Baltimore. Fort Detrick can be reached via a number of interstate and U.S. highways including I-70, I-270, US 40, and US 15. Interstate 270 and other major roadways that converge in the City of Frederick provide convenient access to Washington, DC, Baltimore, and other employment centers in the region. Local access to the Installation is via the surrounding roadway network of city streets, county roads, and state highways. US 15 is a two-lane divided highway serving both regional and local commuter traffic in the City of Frederick. This highway, also known as the Frederick Bypass, is located approximately one-half mile south of Fort Detrick. Average 1998 daily traffic volumes ranged from 33,200 vehicles per day (vpd) for US 340 to almost 94,000 vpd for the Frederick Bypass (Frederick County Department of Planning and Zoning, 2000). The Frederick Bypass

interchanges with Rosemont Avenue, West Seventh Street, and Opossumtown Pike. Rosemont Avenue is a major artery serving north-south travel in Frederick, and it forms the western boundary of Area A. West Seventh Street is a minor north-south artery that serves as the primary access route to Area A of Fort Detrick. The eastern border of Area A is formed by Opossumtown Pike, which is a major north-south artery. Military Road, a southwest-northeast minor artery, runs along the southern boundary of Area A.

There are four access gates to Area A of the Installation: the Main Gate; the Rosemont Gate; the Opossumtown Gate; and the Old Farm Gate. All gates are guarded when open. The Main Gate is located at the intersection of West Seventh Street and Military Road, on the southeast side of Area A. This intersection is controlled by a stop light on the eastbound approach at Military Road, the southbound approach exiting the Installation, and for northbound traffic entering Fort Detrick from West Seventh Street. The Main Gate is open 24 hours a day. Since 10 December 2002, all non-decaled vehicles have been directed to enter through the entrance immediately to the right of the Main Gate on West Seventh Street, Monday through Friday, from 6:00 a.m. to 6:00 p.m. At all other times, non-decaled vehicles enter through the Main Gate. All northbound decaled vehicles continue to enter through the two lanes at the Main Gate. Re-routing non-decaled vehicles to an alternate entry was enacted to decrease the amount of time vehicles wait on West Seventh Street when entering through the Main Gate, while maintaining necessary security precautions (Fort Detrick, 2003). The Main Gate is scheduled to be renovated. This renovation will bring all vehicles through the aforementioned entrance that was previously for non-decaled vehicles. The new design will allow about 75 vehicles to queue on Fort Detrick, providing better security and reducing congestion on West Seventh Street (Frederick News-Post, 2004).

The Rosemont Gate provides access to the Installation from the west. The Rosemont Gate is located just east of the intersection of Rosemont Avenue and Montevue Lane, which is controlled by a traffic signal. As of 10 December 2002, the Rosemount Gate is open for vehicles exiting the Installation between the hours of 3:00 p.m. and 6:00 p.m., Monday through Friday. The gate is closed all other hours.

The eastern gate to Area A, the Opossumtown Gate, is located at the intersection of Porter Street and Opossumtown Pike. Currently, the Opossumtown Gate is open for inbound traffic from 6:00 a.m. to 6:00 p.m., Monday through Friday. To relieve traffic congestion during lunch and afternoon peak traffic hours, the Opossumtown Gate is open for vehicles exiting the Installation from 11:00 a.m. to 6:00 p.m. The Opossumtown Gate is closed on holidays.

The Old Farm Gate is located at the intersection of Rosemont Avenue and Old Farm Road. Vehicles can enter the Installation using the Old Farm Gate from 6:00 a.m. to 6:00 p.m., Monday through Friday. Vehicles can exit through the Old Farm Gate from 6:00 a.m. to 6:30 p.m., Monday through Friday. The Old Farm Gate is also closed on holidays.

4.13.2 ON-INSTALLATION AND SURROUDING ROADWAYS, TRAFFIC, AND PARKING

4.13.2.1 Existing Traffic Conditions

Vehicular transportation on Fort Detrick is available on primary, secondary, and tertiary roadways, which are controlled by signs, striping, and occasional direction by security personnel. Currently there are no traffic signals on the Installation. The primary roadways on

Fort Detrick are Porter Street and Ditto Avenue. Porter Street runs southwest-to-northeast across the Installation with one lane of traffic in each direction. Secondary roadways on the Installation include Randall Street, Freedman Drive, and Nelson Street. Randall Street is a two-lane street, located west of Building 1425, which intersects with Porter Street approximately 900 ft. east of Ditto Avenue. This roadway is approximately 30 ft. wide with curb, gutter, and sidewalks on both sides. Randall Street serves USAMRIID facilities between Porter Street and Sultan Drive at "T" intersections. Freedman Drive is a two-lane street that intersects with Porter Street at "T" intersections on the east and west side of Porter Street. Freedman Drive serves as an access road to Building 1520 (Community Support Center and Commissary; east of Porter Street), and the newly constructed extension of Freedman Drive serves as an access road to Building 1434 (Barquist Army Health Clinic) and the NIBC (west of Porter Street). Nelson Street serves Building 1671 (1110th U.S. Army Signal Battalion) and the surrounding facilities near the Opossumtown Gate.

USAG and the USACE-Baltimore District performed an Installation-wide transportation study to document and characterize traffic conditions and to develop recommendations to improve overall traffic in and around the Installation (STV, Inc., 2003b). Six levels of service (LOS), ranging from A to F, with A representing the optimum operating conditions and F representing congestion, are defined to represent operating conditions. Because of recent growth throughout the area, six intersections are currently operating at an unacceptable LOS. The following locations operate at an unacceptable LOS:

- Rosemont Avenue and Montevue Lane: LOS F during the PM peak hour.
- Rosemont Avenue and Military Road/Baughmans Lane: LOS F during both the AM and PM peak hours.
- Rosemont Avenue and US 15 NB Ramps/Second Street: LOS E during the AM peak hour and LOS F during the PM peak hour.
- Seventh Street and US 15 SB Ramps/Biggs Avenue: the minor street (ramp movements) operates at LOS E during the AM peak hour and LOS F during the PM peak hour.
- Opossumtown Pike and US 15 SB Ramps: the minor street (ramp movements) operates at LOS F during both the AM and PM peak hours.
- Motter Avenue and US 15 NB Ramps/Pinewood Drive: LOS F during the AM peak hour and LOS E during the PM peak hour.

Because demand often exceeds capacity, congestion results on US 15 during the morning and afternoon peak. Delays and queuing are apparent along Rosemont Avenue and West Seventh Street. Vehicles entering Fort Detrick share the same lane heading toward Fort Detrick on West Seventh Street with vehicles not heading towards the Installation. High queuing and delays turning left along West Seventh Street at the southbound US 15 ramps are common. The southbound ramps from US 15 develop morning queues on Opossumtown Pike due to peak activity at Thomas Johnson High School. Another traffic study conducted in 2002 for the City of Frederick is in agreement with the conclusions of the USAG and USACE study (RBA Group, 2003).

North and east of the Main Gate the roadway system operates well with little delay during morning and afternoon peak traffic periods. However, traffic problems occur at the Main Gate due to its design and location. The Main Gate is located between the signalized intersection of West Seventh Street and Military Road, just off the Installation, and the stop-controlled

intersection of Ditto Avenue and Porter Street, approximately 200 ft. north of Military Road, just inside the Main Gate. Traffic approaching these intersections from all other directions is required to stop and yield to inbound traffic. Throughout most of the day these intersections operate well with little delay, including during the morning peak period when inbound traffic dominates. However, when traffic patterns are reversed during the afternoon peak, long queues form, delays are lengthy, and the intersections operate over capacity. To ease the congestion at the Main Gate during the afternoon peak, security personnel sometimes provide manual traffic control. The current roadway loading for Ditto Avenue and Porter Street (the primary access roads to the proposed NBACC Facility) is 12,200 vpd during peak traffic periods (Biddle, 2003). USAG is planning to make upgrades to the gates and roadways of the Installation, including the aforementioned Main Gate and Randall Street (see Figure 2–11 and Figure 2–12). These upgrades are expected to mitigate traffic congestion on and adjacent to the Installation (USAG, 2003a).

4.13.2.2 Existing Parking Conditions at Fort Detrick

The 2003 *Installation-Wide Transportation Study for Fort Detrick* indicated that there were approximately 4,722 parking spaces available on the Installation. Parking facilities on the Installation consist of larger lots near USAMRIID and the USAG Headquarters facilities, smaller lots in the southwestern areas of the Installation, and on-street parking throughout the Installation. The existing parking conditions are generally adequate to support the current needs of Fort Detrick, but some areas have localized inadequacies. According to the PMO, existing parking facilities are not adequate other than in the southwestern section of the Installation. Deficiencies relate mainly to the amount of on-street parking and a high proportion of small, irregular, and poorly defined lots (STV, Inc., 2003b). However, the construction of parking lots near the proposed NBACC Facility and the NIAID IRF will provide additional parking space for facilities on the NIBC.

4.13.3 PUBLIC TRANSPORTATION

Fort Detrick is served by the east-west Blue Route of the Frederick Bus System. The Blue Route provides hourly service between downtown Frederick and the Frederick Towne Mall. In the vicinity of Fort Detrick, the Blue Route has three stops that provide convenient access to Fort Detrick. One stop is at the Main Gate on Military Road; the second stop is at the intersection of Military Road and Rosemont Avenue; and the third stop is at the Old Farm Station Shopping Center at Old Farm Road (west of the Old Farm Gate). The Blue Route also provides service to the Maryland Rail Commuter (MARC) transit station in downtown Frederick (USAG, 2003a).

4.13.4 RAILWAYS

The City of Frederick was connected to the MARC Brunswick Rail Line on 17 December 2001. Service from Frederick includes three trains each morning into Union Station, just outside downtown Washington, DC, and three returning trains in the evening. Trains head for Washington, DC on the Brunswick Line from Point of Rocks. The MARC lines also provide service to Washington, DC, Baltimore, Maryland, and West Virginia. The Pennsylvania Central Railroad and the CSX Railroad system, which includes the Chesapeake and Ohio (C&O) Railroad and the Baltimore and Ohio (B&O) Railroad, provide rail freight service in Brunswick, Maryland, and Harpers Ferry, West Virginia (USAG, 2003a).

4.13.5 AVIATION

The helipad, located in Area A southwest of Building 1520, is used infrequently for emergency air evacuation of medical patients and for “very important person” (VIP) visitors. The Frederick Municipal Airport is located approximately three miles east of Fort Detrick. The Hagerstown Municipal Airport provides limited commercial passenger and cargo air service, and it is located 36 miles northwest of Fort Detrick. The Baltimore-Washington International Airport, Dulles International Airport, and Reagan National Airport provide commercial airline service and are located approximately 54 miles to the east, 43 miles to the southeast, and 50 miles to the southeast, respectively, from the Frederick area (USAG, 2003a).

4.14 ENERGY RESOURCES

4.14.1 ELECTRICITY

The Allegheny Power Company provides electrical power to the Installation via two 35-kV power lines, primarily from the Monocacy substation and secondarily from the Frederick substation. A new substation (the Old Farm; 230-12.5 kV) was constructed in 2003 on an easement adjoining the USDA complex in the north-central portion of Area A (see Figure 2–12). This substation provides electricity to the surrounding Frederick community, but if it is expanded in the future, it could also serve Fort Detrick.

The demand for electricity at the Installation is high due to the energy-intense nature of research activities conducted at Fort Detrick. The total electrical power consumption for the entire Installation was 139,323,476 kWh in fiscal year 2002 and 139,095,726 kWh in fiscal year 2003 (Potter, 2004a; Spears, 2002b). Peak summer electrical usage at Fort Detrick has the potential to overload the electrical substation located south of Building 1434. This substation will be expanded to accommodate new construction projects in the immediate area. The capacity of this substation will be doubled. The current size is estimated to be 10 megavolt amperes (MVA), 34.5 kV to 4.15 X 12.47 kV.

4.14.2 NATURAL GAS

The Frederick Gas Company furnishes natural gas to Fort Detrick. Natural gas consumption for the entire Installation was 5,126,475 ccf in fiscal year 2002 and 2,797,929 ccf in fiscal year 2003 (Potter, 2004a). An annual average of 83 percent of the natural gas provided to the Installation is used by the boiler plant and the incinerators (Spears, 2002a).

4.14.3 STEAM

Approximately 70 percent of all the steam generated at the boiler plant is process steam, which is used in the SSP and the laboratories for sterilization and humidification (USAG, 2003a). Steam is distributed throughout the Installation via an extensive network of overhead and underground steam lines. The steam pressure leaving the boiler plant is 100 to 115 lbs per square inch gauge (psig). The total amount of steam produced for the entire Installation was 559,912,064 lbs in fiscal year 2002 and 602,745,842 lbs in fiscal year 2003 (Potter, 2004a; Spears, 2002b).

4.15 POLLUTION PREVENTION AND WASTE MANAGEMENT

4.15.1 WASTEWATER

4.15.1.1 Wastewater Collection System

Generally, 60 percent to 80 percent of the water that is produced at Fort Detrick becomes wastewater. It is estimated that 90 percent of the total wastewater generated at Fort Detrick is sanitary sewage; the remainder is industrial wastewater (USAMRMC, 2001). Currently, Fort Detrick maintains two sewer systems: the sanitary sewer system and the LSS. Wastewater generated on the western portion of the Installation travels by gravity flow through the sanitary sewer system to the pumping station adjacent to Building 201, and is subsequently pumped to the eastern portion of the Installation to a point where it can gravity flow to the WWTP. Wastewater generated on the eastern portion of Area A flows entirely by gravity to the WWTP, which is located on Area C. Wastewater originating from some of the laboratories on the Installation (i.e., USAMRIID and USDA) is considered to be potentially infectious and is therefore collected separately via the LSS and treated at the SSP. All wastewater processed at the SSP is transported to the WWTP for final treatment, and then it is discharged into the Monocacy River, downstream from both the City of Frederick and Fort Detrick WTP water intakes.

4.15.1.2 Laboratory Sewer System-Steam Sterilization Plant

The LSS, which was constructed in stages between 1949 and 1972, was used for the conveyance of biological wastes produced by former Army biological warfare (BW) laboratories at the Installation until the cessation of offensive BW research in 1969. Potentially infectious wastewater was decontaminated or sterilized in the laboratories before discharge into the LSS, which conveyed the waste to the SSP for a second sterilization treatment. Effluent from the SSP was discharged to sanitary sewers for further treatment at the Fort Detrick WWTP and was eventually discharged to the Monocacy River (USAMRMC, 2002).

Currently, the LSS is used to transport wastewater generated by USAMRIID and the USDA Building 374 greenhouse complex (USAG, 1997). USAMRIID wastewater requires additional sterilization because the facility contains BSL-4 laboratories, which house dangerous and highly infectious etiologic agents. The USDA greenhouse complex is connected to the LSS-SSP system because research at this facility involves exotic and potentially invasive species.

USAMRIID research facilities (Buildings 1412 and 1425) currently utilize the LSS and sanitary sewer service (see Figure 4–13 and Figure 4–14; USAG, 1997). Potentially infectious wastewater from USAMRIID must be sterilized twice prior to discharge into the sanitary sewer system (USAMRMC, 2001). Initially, all BSL-4 wastewater from USAMRIID is decontaminated at the laboratory; then the effluents are sterilized a second time at the SSP. Wastewater from the proposed USAMRIID AF (Building 1408) will also require steam sterilization and will be connected to the LSS-SSP upon completion (USAMRMC, 2002). The NIAID IRF and the NBACC Facility will also house BSL-4 laboratories, but wastewater from these facilities will undergo steam sterilization within respective facilities prior to discharge to the sanitary sewer system.

The LSS consists of approximately 20,000 ft. of underground piping ranging from 2 inches in diameter to 12 inches in diameter. Except for building connections that were installed after 1992, piping is primarily cast iron with leaded bell-and-spigot joints. The newer building connections are constructed from ductile iron pipe with mechanical (stuffing box-type) joints. Property records also indicate the construction of some wrought iron lines, steel lines (constructed in 1953), and some concrete lines (constructed in 1956). The steel and concrete lines presumably were abandoned in the past and are no longer active. LSS piping generally lies above the water table, 10 ft. or less below the ground surface (RASCO, Inc., 1996). To provide physical protection and for identification purposes, LSS lines were encased in a minimum of 6 inches of concrete (USAG, 1997).

Fort Detrick will be replacing the LSS-SSP system. The impacts of abandoning the LSS and constructing new local sterilization facilities to support other Fort Detrick tenants, including the potential presence of underground contamination in Area A from past research activities, were evaluated and found not to be significant (USAG, 1997). However, interim measures (i.e., upgrading portions of the existing LSS) have been initiated to replace segments previously identified as having the highest potential for leakage. The new LSS being installed is a double-wall pipe with built-in leak detection. The SSP remains in use. In addition, some portions of the LSS will continue in service until a new system is constructed. Upon the completion of the new sterilization plant for the treatment of biological wastes from USAMRIID, the LSS will be abandoned after decontamination, and the SSP will be deactivated (USAG, 2003a). The proposed NBACC Facility will be located approximately 791 ft. from the nearest portion of the LSS; however, it will not use the LSS.

4.15.1.3 Wastewater Treatment Plant

The Fort Detrick WWTP, located in Area C, provides secondary treatment through the use of trickling filters. On average, the WWTP operates at 40 to 50 percent of its maximum capacity (2.0 mgd), treating 0.75 to 1.0 mgd of wastewater (Grams, 2003b). Wastewater enters primary settling basins before transport to two parallel, single-stage crushed rock trickling filters for secondary treatment. The effluent exits to secondary settling basins. Chlorine is added during the treatment process, but all wastewater is de-chlorinated with sulfur dioxide prior to discharge into the Monocacy River. WWTP operators utilize the on-site water quality laboratory to perform required bacteriological, chemical, and physical testing of effluent (USAG, 2003a). Sludge generated by the wastewater treatment process is thickened, dried, packed, and sent to a hazardous waste disposal site in Utah (Grams, 2003a). The WWTP operates under NPDES Permit No. MD0020877, which allows an annual average flow of 2.0 mgd of wastewater to be discharged into the Monocacy River. This permit became effective on 01 July 2004, and it expires on 30 June 2009. Special limitations on the effluent from the Fort Detrick WWTP are provided in Table 4-8 (MDE, 2004). In addition to volume limitations, effluent characteristics are limited on an average concentration and total loading basis (i.e., biochemical oxygen demand – 5 days [BOD_5], total suspended solids, total phosphorus, and total Kjeldahl nitrogen). The NPDES Permit also specifies a maximum in fecal coliform bacteria, a minimum concentration of dissolved oxygen, and a restricted range of pH values (COMAR 26.08.03 and 26.08.04). COMAR 26.08.02 requires that discharges to Use IV-P waters not elevate stream temperatures outside the mixing zone above either 75 °F or the ambient temperature of the surface waters, whichever is greater.

The WWTP has sufficient capacity to treat wastewater generated by current activities at Fort Detrick, as well as the spare capacity to accommodate increases in volumes associated with future development activities on the Installation. A study of the toxicity of the WWTP effluent, conducted from October 1998 to June 1999, revealed the effluent did not affect the survival of the test specimens, cladocerans (*Ceriodaphnia dubia)* and fathead minnows (*Pimephales promelas*) (DIS, 1999). USAG is currently coordinating with MDE and requesting their approval for the disposal of sludge generated at the WWTP in the Fort Detrick municipal solid waste landfill (see Section 4.15.2.2). Additionally, as part of the NPDES Permit, a radiological sampling program, biomonitoring program, and toxic chemical testing program will be submitted to MDE in the near future. Procedures for these programs are scheduled to be conducted in 2004-2005 to ensure that the effluent from the WWTP does not exceed the limitations of the NPDES Permit (Lewis, 2004a).

Approximately 30 percent of the water produced at the WTP does not enter the WWTP. This value reached a high of 42 percent in 2002 (Gortva, 2003b). Potential sources of water loss include evaporation from the cooling towers and laboratory process use, water pressure and flow testing, waterline flushing and fire hydrant testing, leaf screen washing at the WTP, lawn watering, outside water usages in the family housing area, irrigation, and fire protection. It is estimated that approximately 4 percent of the water losses occur from leaks in the water distribution and wastewater collection systems (Potter, 2003b). USAG recently completed a survey to identify leaks in the water distribution system. As a result, several leaks were identified and repaired (Potter, 2004b).

Table 4-8. Effluent Limitations from the Fort Detrick WWTP NPDES Permit.

Effluent Characteristics	Monthly Loading Rate (kilograms [kg]/day)	Weekly Loading Rate (kg/day)	Monthly Average (milligrams [mg]/liter [L])	Weekly Average (mg/L)
BOD_5	76	110	10	15
Total Suspended Solids	76	110	10	15
Total Phosphorus	15	23	2.0	3.0
Total Kjeldahl Nitrogen (April 1 to Sept. 30)	23	34	3.0	4.5
Effluent Characteristics	**Maximum**		**Minimum**	
Fecal Coliforms	200 most probable number (MPN) per 100 ml monthly log mean value		N/A	
Total Residual Chlorine	0.093 mg/L (daily); 0.10 mg/L (mo.)		N/A	
Dissolved Oxygen	N/A		5.0 mg/L at any time	
pH	8.5		6.5	

Source: MDE, 2004.

4.15.1.4 Enhanced Nutrient Removal (ENR) Policy

The Fort Detrick WWTP discharges treated wastewater into the Monocacy River, a tributary of the Potomac River, which eventually empties into the Chesapeake Bay. Deterioration of the water quality in the bay has generated a growing environmental concern over the last 30 years. Governor Parris N. Glendening issued an EO, *Nutrient Pollution Reduction Goals for Chesapeake Bay*, instructing the MDE to develop and implement an ENR policy for WWTPs to meet the 2010 goal set in the new Chesapeake Bay Agreement. The USEPA Administrator, the Mayor of Washington, DC, and the Governors of Maryland, Pennsylvania, and Virginia signed the new Chesapeake Bay Agreement in 2000, replacing the first agreement signed in 1987. The Agreement set nutrient loading goals of 3.0 mg/L for nitrogen and 0.3 mg/L for phosphorus for WWTPs with a design capacity at or above 0.5 mgd. The 66 major WWTPs in Maryland produce approximately 30 percent of the nutrient loading of the Chesapeake Bay.

The Fort Detrick WWTP currently treats 0.75 to 1.0 mgd of wastewater, well above the classification limit of this agreement. The forthcoming *Tributary Strategy for Nutrient Reduction in the Upper Potomac River Watershed* will establish load allocations for the Fort Detrick WWTP that will require state-of-the-art nutrient reduction capability. The NPDES Permit has a "re-opener" provision for adding the new nutrient allocations. Under the Tributary Strategy, WWTP improvements to achieve the needed reductions are to be in place by 2010. At this time the nutrient reduction requirement is voluntary, but Fort Detrick will eventually need to develop and implement an upgrade plan for the WWTP in order to meet the requirement (MDE, 2004).

4.15.2 MUNICIPAL SOLID WASTE

4.15.2.1 Fort Detrick Incinerator Complex

The Incinerator Complex consists of two municipal waste incinerators (B-1 and B-4) and two medical waste incinerators (B-5 and B-6) and is located in Building 393 at the western border of Area A, approximately 4,102 ft. west of the proposed site of the NBACC Facility. The municipal waste incinerator units were installed in 1975. In 1995, the facility was expanded by 5,000 $ft.^2$ to accommodate the medical waste incinerators. The municipal waste and medical waste incinerators combined can incinerate over 14,000 tons of waste per year; however, they are currently operating at approximately 23 percent of their capacity (Dressler, 2004b). As stated in Section 4.8.2, Fort Detrick operates the municipal waste and medical waste incinerators under the conditions of the CAA Title V Part 70 Operating Permit (No. 24-021-00131) issued by MDE ARMA (Wolf, 2004a).

Fort Detrick is permitted to operate the municipal waste incinerators under the Refuse Disposal Permit (No. 2000-WIN-0341) issued by the MDE Waste Management Administration (WMA) on 26 June 2000. This Refuse Disposal Permit expires on 25 June 2005 (Wolf, 2002c). Each of the two municipal waste incinerators has the capacity to incinerate 2,000 lbs per hour and can only accept municipal solid waste from Fort Detrick. Types of solid waste permitted for incineration at the Fort Detrick municipal waste incinerators are: residential, commercial, and mixed residential and commercial waste. The municipal solid waste consists of approximately 40 percent animal bedding, 30 percent office waste, 10-15 percent plastics, and 5-10 percent wood waste. NCI-Frederick is the main contributor of municipal solid waste. It contributes 65 percent of Fort Detrick's total municipal solid waste stream (Dressler, 2002a). A total of 2,306.5 tons of municipal solid waste were incinerated at Fort Detrick in 2003 (Dressler, 2004b).

Municipal waste incineration was halted from August to November 2002 due to the emergency water restrictions imposed on the Installation caused by drought conditions. All of the non-hazardous waste collected on post was transported to the Fort Detrick Municipal Landfill without going through incineration. These restrictions did not apply to the medical waste incinerators. All medical, institutional, and special wastes were incinerated and disposed of in the Fort Detrick Municipal Landfill as usual (Dressler, 2002b).

4.15.2.2 Fort Detrick Municipal Landfill

The Fort Detrick Municipal Landfill is permitted to operate under the Refuse Disposal Permit (No. 2000-WMF-0327) issued by MDE WMA. The Refuse Disposal Permit was issued on 05 May 2000, and it expires on 04 May 2005. The permitted area consists of a 60.9-acre fill area within Area B. There is a separate gate for the landfill, which remains locked when landfill operators are not present in accordance with the permit requirements (Adkins, 2003). This landfill may only accept waste generated at Fort Detrick. The types of solid waste permitted include domestic, municipal, commercial, industrial, agricultural, silvicultural, and construction wastes. Types of waste that are not permitted for disposal at the Fort Detrick Municipal Landfill include controlled hazardous substances, liquid waste, special medical waste, radioactive materials, automobiles, large containers such as drums or tanks (unless flattened or crushed and empty of contents), animal carcasses, untreated sewage, truckloads of separately collected yard waste, and tires, unless otherwise specifically authorized by a valid permit issued under COMAR.

The landfill is constructed with compacted cell floors, synthetic geomembrane liners, and a leachate collection system. A cover of six inches of compacted earth is placed over exposed solid waste daily to prevent odor and particulate emissions, and to minimize infiltration of rainwater into active cells. Intermediate and final covers over completed lifts are installed to depths of one-foot and two-feet, respectively. The disposal site is graded to minimize runoff, prevent erosion and ponding, and to drain surface water from the landfill area (USAG, 2003a; MDE, 2000b).

In compliance with the permit to operate the Fort Detrick Municipal Landfill, groundwater monitoring wells are installed for leak detection, and a leachate collection system collects waste liquids for treatment at the Fort Detrick WWTP. Leachate volumes and local rainfall amounts are reported monthly to the MDE Solid Waste Program. The landfill leachate was tested monthly from June 2000 to April 2002 for VOCs and the semi-volatile organic compound (SVOC), bis (2-ethylhexyl) phthalate. The monthly testing schedule was revised to quarterly testing based on non-detects for all results from July 2001 through April 2002. The most recent laboratory analysis shows non-detect results for all VOCs tested and bis (2-ethylhexyl) phthalate (GCI Environmental Services, 2002).

During the scoping and final survey in the decommissioning of the DA's nuclear facilities at Fort Detrick, leachate was analyzed for radioisotope contents. A low-level concentration of tritium was found in the leachate. Analysis of periodic leachate samples from March 2003 to April 2004 showed that the average concentration of tritium was below the drinking water standard set by USEPA (USAG, 2004b). The DA's independent audit report indicated that the tritium in the leachate might be from other non-licensed tritium sealed sources, such as compasses disposed at the landfill (USAG, 2003d). No tritium and other radioisotopes were detected in the groundwater monitoring wells around the landfill. The NRC and MDE allow the leachate to be

pumped back to the WWTP for treatment, and the final discharge of tritium in the leachate to the Monocacy River has negligible environmental consequences (USAG, 2004b).

At the end of 2001, the remaining landfill capacity reported to MDE was 1,380,218 cubic yards (cu. yd.). From 1997 to 2001, the Fort Detrick Municipal Landfill accepted 23,911 cu. yd. of material. The estimated average annual rate of waste disposal based on this five-year average is approximately 4,782 cu. yd., which includes refuse, fill, and cover material. Using this rate as an indication of future activity, assuming that solid waste quantities do not increase significantly, the Fort Detrick Municipal Landfill will reach its maximum permitted load in 91 years and its maximum permitted capacity in 288 years (Dressler, 2002b).

4.15.2.3 Recycling

A variety of materials at Fort Detrick are recycled. Recycled materials include newspaper, white paper, cardboard, glass, aluminum cans, steel cans, and various scrap metals. Computer cards and scrap metal are shipped to the Defense Reutilization and Marketing Service (DRMS) at the Letterkenny Army Depot for recycling. Other DRMS facilities are located in Mechanicsburg, Pennsylvania and Fort Meade, Maryland (USAG, 2003a). Waste oil is also recycled at Fort Detrick. A contracted recycling firm collects the waste oil from various points on the Installation (USAG, 2003a).

4.15.3 SPECIAL MEDICAL WASTE

In general, special medical waste includes human and animal blood or materials soiled with blood, cultures and stocks of infectious agents or materials soiled with infectious agents, syringes, needles, and certain animal bedding. The major generators of medical waste at Fort Detrick are NCI-Frederick (the largest), USAMRIID, and the USDA.

All infectious medical waste is required to be properly packaged for transportation to the disposal site. Special medical waste is collected in 4-millimeter-thick, waterproof, tear-resistant, non-chlorinated, red plastic bags. Contaminated sharps are handled separately and are stored in combustible, impenetrable, and puncture-resistant containers. Packaging and handling procedures for medical waste must be followed precisely, as directed by immediate supervisors and the Installation Safety Officer. All medical waste is disposed of via the Fort Detrick medical waste incinerators in compliance with Federal, State, and local regulatory requirements (Schultz, 2004).

Medical waste that is delivered to the incinerator is inspected to ensure that packages are properly sealed, identified, and labeled. Any controlled hazardous substances found in medical waste are segregated, and arrangements are then made for the transportation of the substance to a permitted facility. The Solid Waste Program of MDE is notified within one hour of such an incident, and a written report is submitted to MDE within 48 hours (MDE, 2000b).

Fort Detrick is permitted to operate the medical waste incinerators under the Refuse Disposal Permit (No. 2000-WIN-0341) issued by the MDE WMA on 26 June 2000. The two medical waste incinerators have the capability to safely incinerate and decontaminate infectious materials generated from the Installation’s research activities. Each of the two medical waste incinerators has the capacity to incinerate 1,000 lbs per hour (Wolf, 2002c). On average, 3.6 tons of medical waste per day are incinerated at Fort Detrick (Dressler, 2004b). Table 4-9

presents the total amount of medical waste incinerated for fiscal years 2000 to 2003 (Dressler, 2004b; 2002b). The incinerators are operated 8 hours a day, 5 days a week, but are permitted to operate 24 hours. Both incinerators may be operated at the same time, although typically one incinerator is in operation while the other is down for routine maintenance (Dressler, 2002a).

Table 4-9. Total Medical Waste Incinerated at Fort Detrick (FY 2000-2003).

Year	Pounds
FY 2000	1,393,552
FY 2001	1,432,277
FY 2002	2,045,416
FY 2003	1,887,933

Source: Dressler, 2004b; 2002b.

Ash from the medical waste incinerators is sampled and analyzed, and the analytical results are submitted to MDE. A free liquids test is performed on a quarterly basis, and a Toxicity Characteristic Leaching Procedure (TCLP) is conducted semi-annually (USAG, 2003a; Wolf, 2003b). Medical waste is regulated by Federal, State, and local regulations to protect transporters and the public from potential hazards that are associated with possible infectious agents in the waste. Medical waste at Fort Detrick is incinerated in accordance with CDC/NIH guidelines (CDC/NIH, 1999).

From September through October 2001, Federal postal facilities and government offices in the Washington, DC area received mail contaminated with *Bacillus anthracis* (anthrax) bacteria and/or spores. Emergency measures to contain the contamination inside Federal postal and government facilities resulted in the collection of materials potentially contaminated with anthrax. In an effort to safely dispose of the collected materials, to protect public health and safety, the USEPA requested the MDE's permission to allow Fort Detrick to accept and incinerate the wastes being generated by the Washington, DC anthrax emergency response and cleanup (MDE, 2001). MDE determined that the Fort Detrick Incinerator Complex constituted the "most modern, safest, and most secure option for disposing of these materials in the area" (MDE, 2002). On 15 November 2001, MDE authorized a Consent Order allowing Fort Detrick to accept these materials generated from the decontamination of the Federal facilities, provided that each facility sending waste submit a plan for packaging and transporting the waste to Fort Detrick. This Consent Order (MDE No. CO-02-SW-033) was effective for 90 days. A supplement to the Consent Order was then added, extending the Consent Order to no later than 30 August 2002 (MDE, 2002). The wastes generated generally consisted of decontamination water, decontaminated PPE, and decontaminated debris. The possibly contaminated materials were double-sealed in certified medical waste bags, and double-packaged in plastic transportation containers. These containers were transported by licensed Special Medical Waste haulers for disposal at Fort Detrick. Upon arrival, the material was unloaded and incinerated by Fort Detrick staff (MDE, 2002). The decontamination water was conveyed to the SSP for treatment.

Employees of facilities that generate or handle medical waste must be trained in the safe handling of infectious agents, associated equipment, and proper disposal procedures for medical waste. SOPs have been established to support and comply with the *Exposure Control Plan for the Occupational Exposure to Bloodborne Pathogens* (29 CFR 1910.1030). These policies and procedures are applicable to all DIS personnel of the Refuse Collection and

Disposal Section who come into contact with blood or other potentially infectious medical wastes. All DIS personnel receive initial and annual training, which includes instructions for use of PPE. All DIS refuse personnel are offered the hepatitis B vaccine within 10 working days of their initial work assignment (USAG, 2003a).

4.15.4 HAZARDOUS WASTE

In accordance with Fort Detrick Pamphlet (FD PAM) 200-3b*, Hazardous Waste Management Plan and Procedures*, all hazardous waste that is generated on the Installation is collected by the generating tenant in Satellite Accumulation Points (SAPs). A SAP is a hazardous waste collection area where a generator may accumulate up to 55 gal of hazardous waste or 1 quart of acutely hazardous waste (i.e., P-listed). SAPs are located at the point of generation and are under the control of the facility operator. All containers in a SAP must be clearly marked as "Hazardous Waste" or with the contents of the container. The accumulation start date is the date that the waste leaves the SAP, which simultaneously starts the 90-day time period that hazardous waste may be stored in a temporary storage area. Additional requirements for the operation of SAPs are provided in FD PAM 200-3b. Hazardous waste containers are transported by the Hazardous Material Management Office (HMMO) from a SAP to an approved temporary storage area within 72 hours of reaching the 55-gal hazardous waste limit or the 1-quart acutely hazardous waste limit (USAG, 2003a).

Hazardous waste and spent hazardous materials (SHMs) must be collected at designated SAPs on the Installation. The USAMRIID (Building 1412) and USDA (Building 1301) SAPs and the 90-day hazardous waste storage facility in Building 1425 are located on the NIBC. Disposal of hazardous waste and SHM must be performed in accordance with applicable Federal, State, local, and DA regulations (USAG, 2003a).

A temporary storage area is a location where hazardous waste is stored for up to 90 days after it leaves a SAP. Requirements for temporary storage areas include secondary containment, chemical resistant and seamless floors, emergency equipment (e.g., phone, PPE, shower, fire extinguisher), and appropriate warnings and signs indicating the potential hazards associated with the facility. Once wastes are received at a temporary storage area, they are separated according to their USEPA hazard classification (i.e., ignitable, corrosive, toxic, and/or reactive). Additional specifications for temporary storage areas are listed in FD PAM 200-3b (USAG, 2003a).

Hazardous waste, as defined in COMAR 26.13.02.03, includes a wide variety of substances and toxics, generated or used in a multitude of processes. The types and quantities of hazardous waste generated at Fort Detrick are also diverse. Biomedical research laboratories and infrastructural support activities are the major sources of hazardous waste at the Installation. Laboratory research activities typically generate small quantities of many different types of hazardous waste, while other activities with more predictable waste streams usually generate larger quantities of fewer types of hazardous waste. All hazardous waste generated in the proposed NBACC Facility will be managed and disposed of in accordance with USEPA and MDE requirements. Hazardous waste will be shipped off-site for disposal in accordance with all U.S. Department of Transportation shipping requirements.

4.15.5 RADIOLOGICAL WASTE

Radiological waste generated by the NBACC Facility will be disposed of in accordance with all NRC requirements. All radiological waste will be shipped off-site for disposal. The U.S. Department of Transportation specifies requirements for container safety, labeling, routing, and emergency response for low-level radiological waste. These requirements are described in 49 CFR Parts 171-179 (*Hazardous Materials Regulations*).

4.16 HAZARDOUS MATERIALS MANAGEMENT

Fort Detrick Regulation (FD REG) 200-3 assigns responsibilities for the proper management of hazardous materials at Fort Detrick. AR 200-1, *Environmental Protection and Enhancement*, provides guidance for the identification and management of hazardous materials at DA facilities. The Hazardous Material Management Program (HMMP) for Fort Detrick is described in FD PAM 200-3a. According to FD REG 200-3, the Installation Commander supervises the HMMP and is responsible for establishing procedures for the protection of human health and welfare, including the distribution of MSDSs for all hazardous chemicals. The Environmental Management Office provides support to and oversight of the HMMP. The HMMO directs the implementation of the HMMP and has established BMPs for activities involving the use of hazardous materials.

Tenants and organizations at Fort Detrick are responsible for obtaining their own hazardous materials. Individual tenants obtain hazardous materials from private manufacturers for shipment directly to their facilities. Hazardous materials are then stored in or near the users' laboratories typically in cabinets, refrigerators, or freezers. In addition to agency-specific SOPs, all tenants must comply with the requirements of Federal, DA, USAG, State, and local regulations with regard to the procurement, use, storage, and disposal of hazardous materials. FD REG 200-3 and FD PAM 200-3a provide procedures and guidelines for the management of hazardous materials.

The Fort Detrick Fire Protection Division (FPD) provides fire prevention and protection services to the Installation, which includes responding to emergencies involving hazardous materials. In addition to three fire engines, the FPD maintains and operates a fully-equipped hazardous materials response unit. Ambulance service is provided by the City of Frederick. DIS also maintains equipment and materials to assist in the cleanup of hazardous material spills. In accordance with the Superfund Amendments and Reauthorization Act (SARA), the FPD receives copies of all MSDSs for hazardous materials stored in USEPA reportable quantities on the Installation and receives itemized lists of the hazardous materials stored in non-reportable quantities. FPD personnel and employees who manage or handle hazardous materials are trained in accordance with Federal, DA, USAG, state, and local regulations.

4.16.1 HAZARDOUS LABORATORY CHEMICALS

29 CFR 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories*, sets forth procedures for the handling of hazardous chemicals in laboratories and describes the safety standards that must be applied in a laboratory setting in which a chemical hazard exists. In accordance with this regulation, laboratories must develop a written CHP that details work practices capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular environment, as well as general procedures for the operation

of equipment and PPE. The CHP and laboratory-specific procedures must provide information about handling controlled substances, chemical acquisition, chemical storage, potential health risks, environmental monitoring, PPE, use of fume hoods, safety procedures, inspections, and laboratory audits. The CHP and other written safety policies and procedures must be available for all laboratory personnel.

Hazardous chemical storage facilities are constructed and operated in accordance with 29 CFR 1910, DoD Manual 4145.19M2, and other applicable regulations. The compatibility of chemicals, ventilation, firewalls, containment, and protection from the elements are required considerations for the storage of hazardous materials. Appropriate hazard communication information (e.g., warning signs and labels) must be posted to alert personnel to the presence of hazardous chemicals. PPE must be available for worker protection, and health and safety materials must be available for emergency response/cleanup, treatment, and decontamination. The HMMP specifies that all hazardous materials and their containers must be used and disposed of according to label instructions as described in AR 200-1. Finally, the HMMO is responsible for ultimate disposal of all excess and unserviceable hazardous chemical stocks.

SARA establishes the reporting requirements for the storage and release of hazardous materials (i.e., threshold planning quantities [TPQs] and reportable quantities for hazardous materials). SARA requires that the owner or operator of any facility that stores hazardous materials in reportable quantities must provide a list of all hazardous materials stored and their corresponding quantities and MSDSs to the appropriate State Emergency Response Commission, Local Emergency Planning Committee, and the local fire department. Six chemicals are stored in USEPA reportable quantities on the Installation: aluminum sulfate, nitrogen, sulfuric acid, sulfur dioxide, chlorine, and No. 6 fuel oil. Aluminum sulfate is stored at the WTP (Area C, Building 1132). Nitrogen is stored at the SSP (Building 375) and USAMRIID (Building 1425). Sulfuric acid and No. 6 fuel oil are stored at the Boiler Plant (Building 190), and sulfur dioxide is stored at the WWTP (Area C, Building 1110). Chlorine gas is stored at the WTP (Area C, Building 1123) and the WWTP (Area C, Building 1110). Under SARA Title III (40 CFR 370), Section 312 of the *Emergency Planning and Community Right-To-Know Act*, USAG and NCI-Frederick annually submit Tier Two Emergency and Hazardous Chemical Inventory Reports (Tier Two Inventory Reports) to MDE, the Frederick County LEPC, and the Fort Detrick Fire Department as required by USEPA regulations (see Table 4-10 and Table 4-11).

Table 4-10. USAG RY 2003 Tier Two Chemical Inventory Summary.

Chemical	CAS Number	Average Daily Amount (lbs)	Maximum Daily Amount (lbs)
Aluminum Sulfate	10043-01-3	<100	1,000 - 9,999
Chlorine	7782-50-5	<100	1,000 - 9,999
Nitrogen	7727-37-9	1,000 - 9,999	1,000,000 - 9,999,999
No. 6 Fuel Oil	68553-00-4	1,000,000 - 9,999,999	1,000,000 - 9,999,999
Sulfuric Acid	7664-93-9	<100	1,000 - 9,999
Sulfur Dioxide	7446-09-5	<100	100 - 999

Source: USAG, Fort Detrick RY 2003 Tier Two Emergency and Hazardous Chemical Inventory Report (USAG, 2004c).

Table 4-11. NCI-Frederick RY 2003 Tier Two Chemical Inventory Summary.

Chemical	CAS Number	Average Daily Amount (lbs)	Maximum Daily Amount (lbs)
Carbon Dioxide	124-38-9	10,000 - 99,999	100,000 - 999,999
Chloroform	67-66-3	100 - 999	1,000 - 9,999
Ethylene Glycol	107-21-1	10,000 - 99,999	10,000 - 99,999
Methylene Chloride	75-09-2	10,000 - 99,999	10,000 - 99,999
Nitrogen	7727-37-9	100,000 - 999,999	100,000 - 999,999
No. 2 Diesel Fuel	68334-30-5	10,000 - 99,999	10,000 - 99,999
Propylene Glycol	57-55-6	10,000 - 99,999	10,000 - 99,999

Source: NCI-Frederick RY 2003 Tier Two Emergency and Hazardous Chemical Inventory Report (NCI-Frederick, 2004).

4.16.2 PESTICIDE MANAGEMENT

All pest management activities at Fort Detrick are implemented in accordance with the current Installation Pest Management Plan (IPMP) (USAG, 2003e). The IPMP outlines procedures for pest surveillance, non-chemical and chemical pest management techniques, as well as health and environmental safety procedures. Per AR 200-5, *Pest Management,* the Fort Detrick IPMP is updated annually and sent to the Pest Management Consultant (PMC) at the U.S. Army environmental Center (USAEC). The Fort Detrick IPMP is submitted for a formal, full-document review every five years. The 2004 update of the Fort Detrick IPMP is complete (Bennett, 2003b; Boyland, 2004b).

Chemical pest control is employed only when other pest control methods are ineffective or not practical. All pesticides are applied per USEPA- and State-approved label directions, and pesticide applications are conducted in a manner aimed to eliminate risks to human health and to limit potential, negative impacts on the environment. The application of pesticides at Fort Detrick is carried out by trained and certified pest management personnel or by certified and licensed outside contractors. Pest management personnel or contractors at Fort Detrick only use USEPA- or State-approved pesticides as outlined in the IPMP (USAG, 2003e).

4.17 ENVIRONMENTAL RESTORATION

4.17.1 POTENTIAL ENVIRONMENTAL CONCERNS IN AREA A

Several sites in Area A have been identified as areas of potential environmental concern through the Fort Detrick Remedial Investigation (RI), historical records, and geophysical investigations. These areas are the water tower sites; the Area A skeet range; the cleanfill and combustible burn pit sites; the south-central Area A disposal site; the simulant SM (*Serratia marcescens*) testing area (1953-1955); the western Area A landfill; a possible medical waste landfill near Building 535; the LSS; the TCE spill site near Building 568; the fuel oil plume near Building 190; and the gasoline storage tank leaks near Building 950 (DA, 1977; USACE, 2000a; NCI and USAG, 2003). Both the former south-central Area A disposal site and the former simulant SM testing area are located on the proposed site of the NBACC Facility (see Figure 4–12).

4.17.1.1 Water Tower Sites

There are three water tower sites located in Area A, designated south, west, and north (see Figure 4–13). The soil surrounding the water towers is contaminated with lead. Fort Detrick has implemented land use restrictions under each tower to minimize lead exposure. According to the human health risk assessment performed for the water tower sites and included in the remedial investigation report, it was determined that lead concentrations near the water towers posed no significant risk to human health since residential properties are not located near these towers. No remedial action is required for these sites (USACE, 2000a).

4.17.1.2 Area A Skeet Range

A possible recreational skeet range in the southeast corner of Area A was identified in November 2002 (see Figure 4–13 and Figure 4–14). The range was in operation from approximately the 1950s through the 1980s. The former skeet range was located at Building 1520 and extended out approximately 1,000 ft., in an arc southeast to north-northwest (towards Building 1434 [Barquist Army Health Clinic]). Because lead contamination from firearm discharge in this area was a potential concern, a soil investigation was performed on this site in July 2003. Laboratory analytical results showed lead concentrations to be from 31 to 104 milligrams per kilogram (mg/kg), which are slightly above background levels for that area (i.e., 12 to 28 mg/kg). However, the levels were not higher than MDE residential and industrial risk-based concentration (RBC) levels of 400 mg/kg and 1,000 mg/kg, respectively. Therefore, no remediation of the area was deemed necessary. These slightly elevated lead levels may be attributed to the operation of the former skeet range in this area (Gortva, 2003c).

4.17.1.3 Cleanfill Area

Another area of potential concern is the Cleanfill Area, which is located in the southeastern portion of Area A and encompasses approximately 500,000 $ft.^2$ (11.5 acres; see Figure 4–13 and Figure 4–14). The estimated fill depth increases from east to west, less than 3 ft. to 6 ft., respectively. Minor sinkholes were observed east of the heliport and are ascribed to the fill. This area received construction material such as rock, soil, asphalt, and concrete. No records of hazardous waste disposal in this area were found, and the geophysical survey confirmed this observation (USACE, 2000a).

A Phase I investigation incorporated a geophysical survey and soil investigation. Concentrations of a SVOC, benzo(a)pyrene, detected in two samples, and a Polychlorinated biphenyl (PCB), Aroclor 1260, detected in one sample, exceeded residential RBCs. Arsenic was the only chemical detected that exceeded both maximum background levels and the USEPA Region III residential and industrial RBCs. The risk estimates for workers exposed to the detected chemicals were at the very low end of USEPA's target risk range. Due to the low risk estimate, no further action was taken (USACE, 2000a).

High concentrations of arsenic and lead were found at one soil boring location at the eastern edge of the cleanfill area (the new commissary site). These analytical results prompted further investigation by USAG. In Fall 2002, a laboratory retest of one soil boring sample was

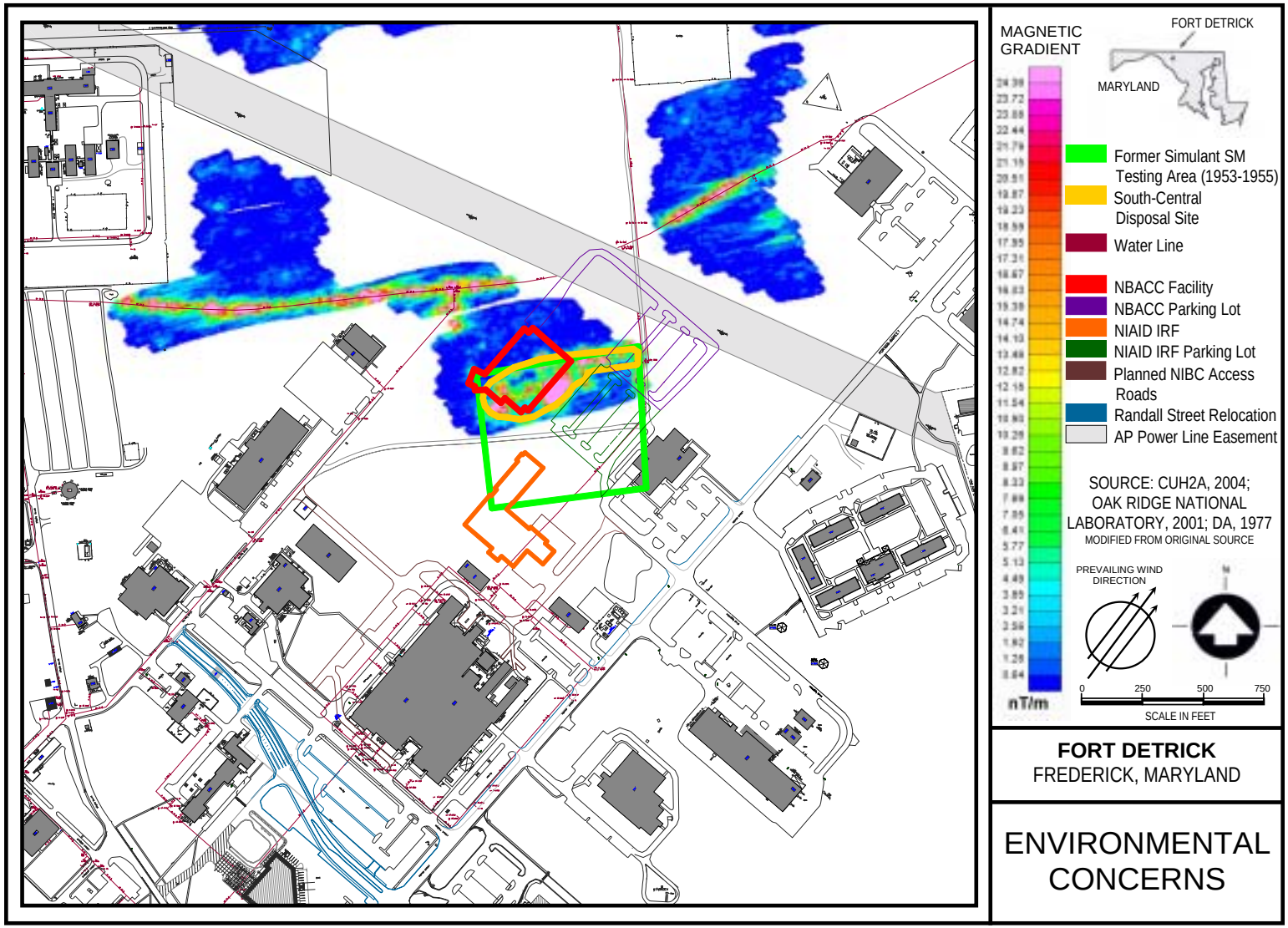

Figure 4–12. Potential Environmental Concerns on the Proposed NBACC Facility Site.

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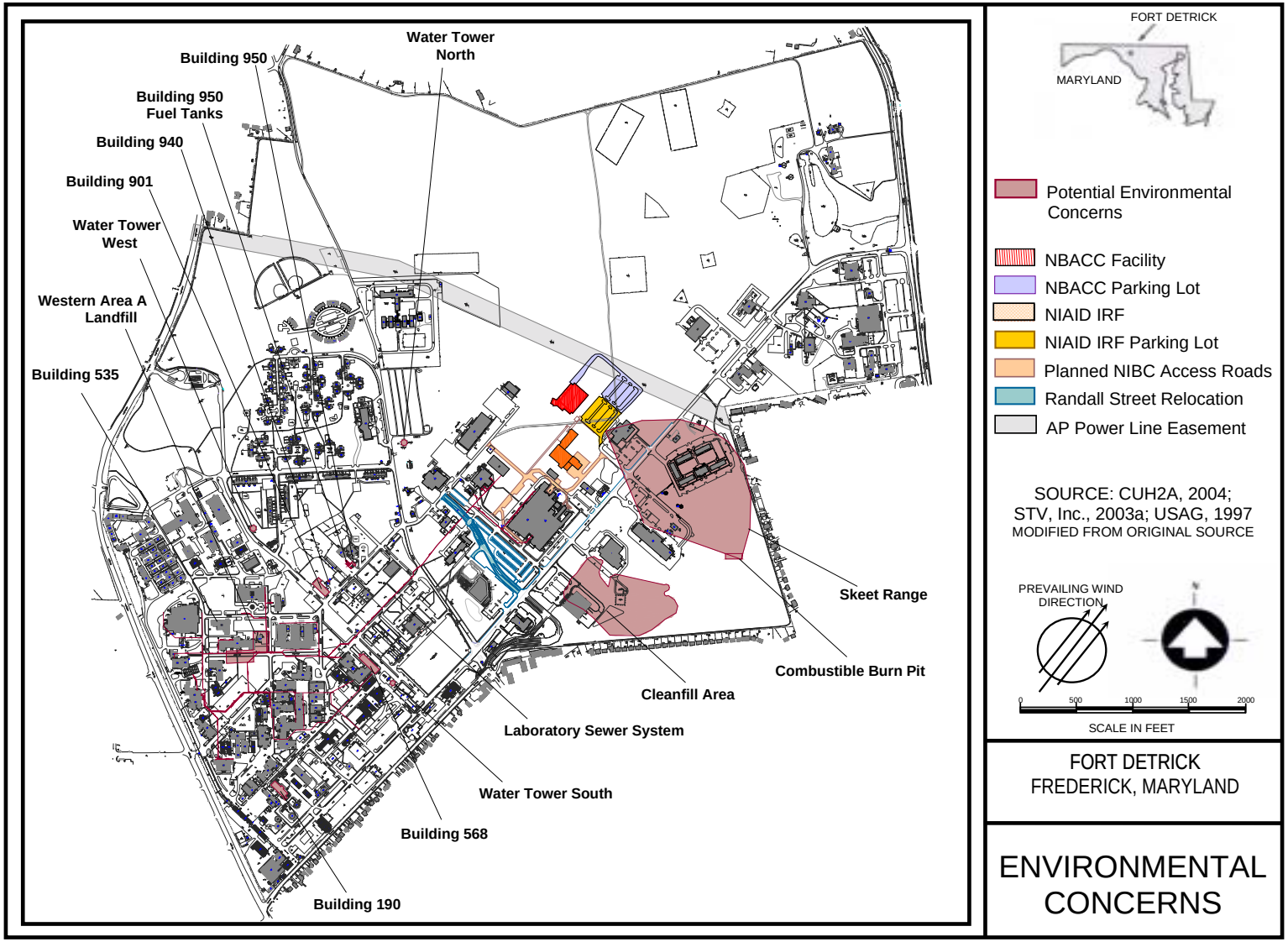

Figure 4–13. Potential Environmental Concerns on Area A.

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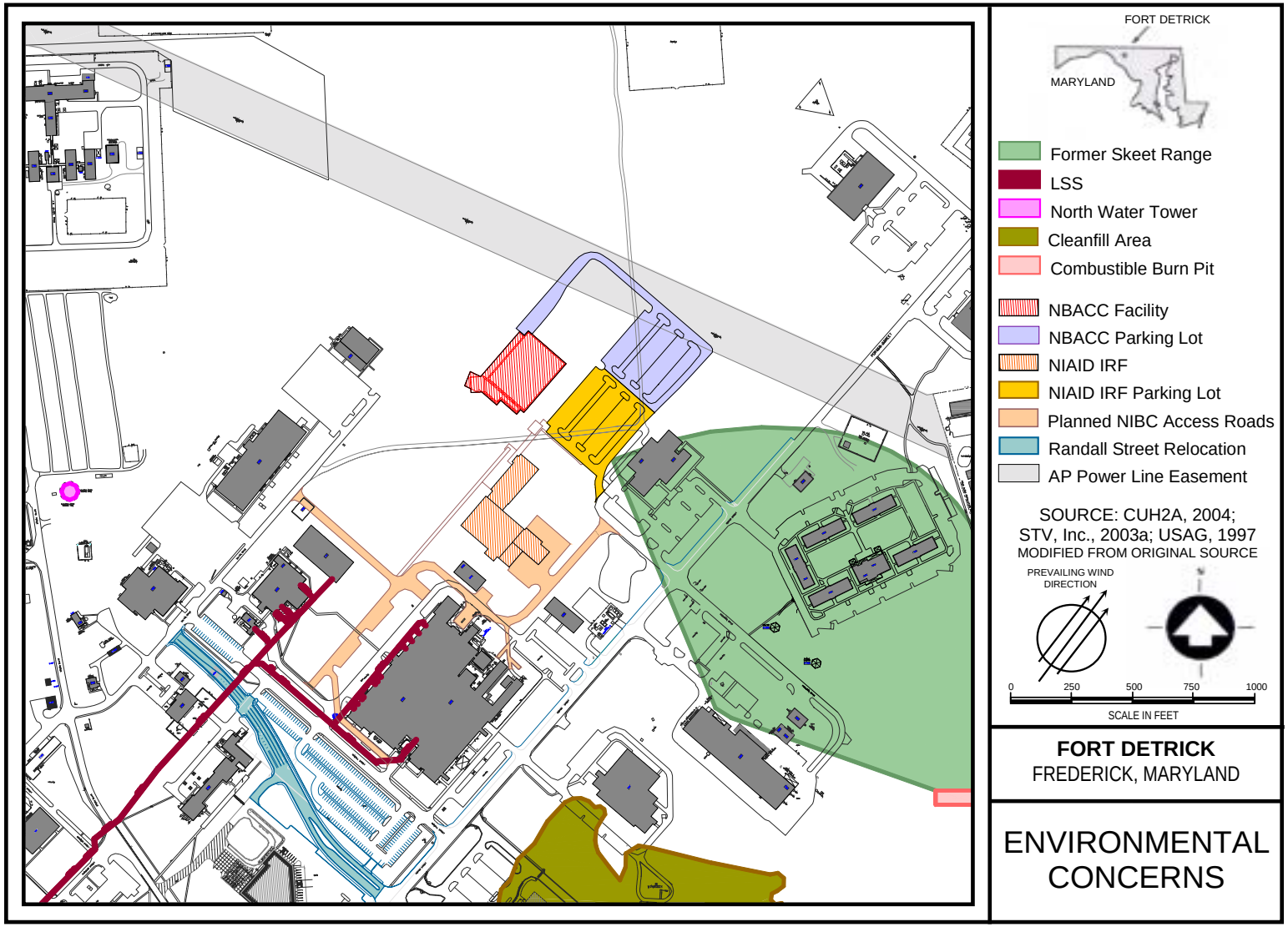

Figure 4–14. Potential Environmental Concerns Near the Proposed NBACC Facility Site.

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performed to determine if possibly a metal fragment from the fill material was included in the soil sample, which would misrepresent the heavy metal concentrations at this sample location. The concentrations were still found to be above MDE and USEPA action levels. However, the background levels for arsenic in Frederick, including Fort Detrick, occur naturally above USEPA residential and industrial RBCs. Specifically, Area A has background levels of arsenic ranging from 5.31 to 71 mg/kg. Thus, the elevated arsenic level found at this soil boring location was within the background range for Area A, and no remediation was required (Gortva, 2002; Sheffer, 2002b; Schnabel Engineering Associates, Inc., 2002).

The elevated lead concentration found at the above-mentioned soil boring location may be due to the presence of lead-based paint chips in the soil sample that was analyzed (Gortva, 2002). In 2003, a test trenching investigation at this site revealed asbestos-containing material in one test trench. The buried asbestos-containing material and surrounding soil at this location were removed in May 2004 (Gortva, 2004).

4.17.1.4 Combustible Burn Pit

A former combustible burn pit (150 ft. x 20 ft.) is located in the southeast corner of Area A, approximately 500 ft. east of Building 1520 and approximately 140 ft. west of the A-3 outfall (see Figure 4–13 and Figure 4–14). The pit was used to burn scrap lumber, and it was also assumed that a petroleum product was used to ignite the material. The area is presently grass-covered, and surface soil samples reveal no evidence of past burning activities (USACE, 2000a).

A Phase I soil investigation of the combustible burn pit consisted of a surface geophysical survey. A Phase II soil investigation of the pit included three soil borings to determine if soil contamination was present at the surface (depths 2 ft. below ground surface [bgs] or less) and subsurface (depths greater than 2 ft. bgs) of the burn pit area. Both organics (VOCs, SVOCs, pesticides, and PCBs), and inorganics (arsenic, beryllium, copper, iron, lead, magnesium, mercury, and cyanide) were detected at low levels in the soil samples. Concentrations of VOCs, SVOCs, pesticides, or PCBs did not exceed USEPA Region III residential RBCs. At 5 to 6 ft. bgs there was no burn evidence (debris or disturbed soil), indicating that past burning activities have not contaminated soils at this depth. Due to the low risk estimate, no further action was taken (USACE, 2000a).

4.17.1.5 South-Central Area A Disposal Site

A 2001 airborne geophysical survey of Fort Detrick revealed magnetic anomalies within the proposed footprint of the NBACC Facility, approximately 400 ft. northwest of Building 1434 (Barquist Army Health Clinic). A visual reconnaissance in October 2002 uncovered a previously unknown disposal site at this location (see Figure 4–12). Electrical power lines on areas surrounding the proposed NBACC Facility site obscured the airborne geophysical survey in these areas. Thus, the presence of magnetic anomalies, suggestive of buried materials, near the proposed site could not be precluded. In March 2003, an electromagnetic terrain survey using portable instrumentation was conducted on areas not covered by the 2001 airborne geophysical survey. This terrain survey concluded that no large buried electromagnetic anomalies were present within the surveyed areas, located immediately southwest of the proposed NBACC Facility site (Shaw Environmental and Infrastructure, Inc., 2003a). The 2001 airborne geophysical survey map was cross-referenced with an existing Installation base map depicting both aboveground structures and buried utilities. Based upon the utility line information

from this base map, the line of pink/red-colored anomalies, which runs west-to-east through the southern portion of the NIBC, was assumed to be the delineation of a 12-inch cast iron water line (see Figure 4–12; Williams, 2003).

A trenching investigation was completed on the disposal site in April 2003. This investigation included the excavation of twelve 50-foot long, 4-foot deep trenches (see Figure 4–15). Objects discovered in this study included metal pipes, rebar, and large quantities of limestone fill (see Figure 4–16). Elevated levels of arsenic and iron were detected; however, these values were within the background levels of the area (Shaw Environmental and Infrastructure, Inc., 2003b). These investigations provided no evidence of buried hazardous materials on the south-central disposal site.

4.17.1.6 Simulant SM Testing Area (1953-1955)

During the time period of 1953-1955, DA records indicate that outdoor testing of a biological simulant (*Serratia marcescens*) was conducted on the southern portion of the NIBC (see Figure 4–12). The DA records show the testing area to be approximately 5.7 acres in size, spanning a portion of the NIAID IRF site, the proposed NBACC Facility site, and Building 1434 (DA, 1977). *S. marcescens* is a common microbe that lives in soil, water, on plants, and in animals. It is a member of the family Enterobacteriaceae and a human pathogen responsible for a large percentage of nosocomial infections (nosocomial infections are those that originate or occur in a hospital or hospital-like setting). In the last three decades there has been a steady increase in nosocomial *S. marcescens* infections, especially in neonates and immuno-compromised patients. From a health and safety standpoint, *S. marcescens* is of concern due to its virulence and increasing resistance to antibiotics, as well as to the increasing number of cases. Human infections attributed to *S. marcescens* unrelated to hospital settings are uncommon (Johns Hopkins Medical Institutions, 1997). Ample evidence indicates that it is highly unlikely that populations of *S. marcescens* would survive 50 years after simulant testing ceased (Ko et al., 2000; Weiss et al., 1975; Cox et al., 1974; Riley and Kaufman, 1972).

4.17.1.7 Western Area A Landfill

Historical records allude to possible landfill materials present to the south and east of Building 538 (see Figure 4–13). Landfill materials were encountered and documented during the construction of Chandler Road in 1952. This waste was possibly placed there prior to 1947 (USACE, 2000a). The location of this landfill was not confirmed through geophysical surveys, and wastes were not encountered during the installation of several underground utility lines. All anomalies encountered were attributed to buried utilities, geological features (such as shallow bedrock), and interference from high magnetic field areas surrounding Building 538 (USACE, 2000a). Therefore, the *Fort Detrick Remedial Investigation Report, Area A, Revised Final* concluded that a buried landfill to the south and east of Building 538 does not exist due to the minimal historical documentation and lack of geophysical evidence (USACE, 2000a).

4.17.1.8 Medical Waste Landfill Near Building 535

Another possible landfill on the NCI-Frederick Main Campus was discovered during excavation activities at the Building 535 site in 1992 (see Figure 4–13). An anecdotal report indicated that buried medical waste and laboratory equipment were discovered at this site. No historical

Figure 4–15. South-Central Disposal Site – Trenching Study.

Figure 4–16. South-Central Disposal Site – Rebar.

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records were discovered to account for the origin of the waste. However, there is no evidence to support this finding nor historical records to account for the origin of the waste (Ritter, 2003).

4.17.1.9 Laboratory Sewer System

The LSS underlying Area A is of potential environmental concern because of the possible contamination from past biological warfare liquid wastes and radioactive materials. The LSS is discussed in detail in Section 4.15.1.2 (see Figure 4–13 and Figure 4–14).

4.17.1.10 Building 568 TCE Spill

The Building 568 TCE spill site is located on the extreme southwestern portion of Area A (see Figure 4–13; USACE, 2000a). The groundwater gradient obtained for this TCE spill site during the remedial investigation indicated that groundwater flow is to the southwest in the area of the Building 568 spill site. Also, due to the continuous remedial pumping activities at Building 568, contaminated groundwater is prevented from migrating from the area. A decision document requiring long-term monitoring of the TCE spill site was signed in 2001 (Gortva, 2003a).

4.17.1.11 Building 190 Fuel Oil Plume

Separate from the RI investigations at Area A, a fuel oil plume near Building 190 is currently being examined (see Figure 4–13). Building 190 houses the Fort Detrick boiler plant, which commenced operation in the 1950s. The plant operates six boilers, all of which are fueled by natural gas with No. 6 fuel oil for a backup fuel. A tank farm consisting of ten 53,000-gal No. 6 fuel oil underground storage tanks (USTs) was installed adjoining Building 190 between 1954 and 1956. In 1967, a 650,000-gal No. 6 fuel oil aboveground storage tank (AST) was installed adjacent to the UST tank farm (USACE, 2002a; USACE, 2002b).

When the site of the tank farm was characterized to select the location for an additional 250,000-gal No. 6 fuel oil AST in 1994, traces of No. 6 fuel oil were found in three out of four boreholes (USACE, 2002a). The ten USTs were removed in early 1995; and according to the MDE records, several of them were leaking and free-phase petroleum product was observed floating on the water surface (MDE, 1999). Following these observations, groundwater monitoring was initiated to assess the extent of free-phase No. 6 fuel oil in the aquifer, and a Corrective Action Plan (CAP) was established (USACE, 1999). In addition, a fuel oil recovery system was installed near Building 190 to meet MDE cleanup requirements (USACE, 2002a). The recovery well has yielded over 144 gal of No. 6 fuel oil as of March 2004 (Gortva, 2004).

Recommendations for future remedial actions at the former UST site include development of a conceptual site model and evaluation of corrective action alternatives based on the site model (USACE, 2002a). The conceptual site model involves geologic and geophysical investigations, an approximation of hydrogeologic properties of the area, and long-term monitoring of groundwater. Much of this work has already been completed (USACE, 2002a).

During the removal of the leaking USTs, contaminated soil surrounding the tanks was also removed. Risks to site workers from the soil in this area are negligible, but full cleanup of the groundwater in the area of the fuel oil spill was impractical due to the nature of the karst topography on Fort Detrick. Therefore, unacceptable risks to workers may exist if construction occurs that intersects the groundwater in this contaminated area (USACE, 2000a). A 2002 map

shows that fuel oil contamination in the groundwater does not extend as far as the proposed site of the NBACC Facility. Contamination extends as far east as Schertz Street (USACE, 2002a), which runs north-south, approximately 3,900 ft. southwest of the proposed NBACC Facility site. In addition, groundwater in the area of the fuel oil spill flows to the southwest.

4.17.1.12 Building 950 Gasoline Storage Tank Leaks

On 29 November 1991, a 12,000-gal gasoline UST was discovered to have leaked approximately 3,900 gal of unleaded gasoline. This tank was located adjacent to Buildings 940 and 901 (see Figure 4–13). The tank was emptied on the day that the leak was discovered, and it was removed in December 1991. Subsequently, groundwater monitoring wells were installed in Buildings 940 and 950 to assess the extent of groundwater contamination from the leak. Samples taken from some of the wells indicated low to high concentrations of gasoline-related VOCs (e.g., benzene, TCE, and chloroform). Benzene concentrations in the groundwater sampled from the monitoring wells were found to exceed the maximum contaminant level for drinking water (U.S. Army Center for Health Promotion and Preventive Medicine [USACHPPM], 1998).

In April 1993, a leak of 400 gal of gasoline was reported at the existing Fort Detrick service station (Building 950), and in June 1993, five, 8,000-gal gasoline USTs were excavated. Several perforations in the tanks were noted, as was contamination of the soil surrounding the tanks. Six monitoring wells were installed near Building 950. Samples from the wells in 1995 and 1998 showed high concentrations of gasoline-related VOCs (e.g., benzene, toluene, ethylbenzene, xylene, and methyl tertiary-butyl ether).

In 2001, USACHPPM made the following conclusions and recommendations for the site: The groundwater surrounding Building 950 is contaminated with residual organic compounds related to the 1993 gasoline leak. Benzene concentrations in one of the monitoring wells exceed the USEPA standards for drinking water. However, water quality data indicate that natural attenuation is occurring and that concentrations have decreased from 1995 to 2001. The results seem to suggest a low risk of regional groundwater contamination. The recommendations for the site are to close down the monitoring wells since the site is capped with pavement and natural attenuation appears to be occurring. If the site is to remain open, then a site-specific dye trace and a long-term groundwater-level study must take place (USACHPPM, 2001). USAG has sent these site close-out recommendations to MDE, and it is currently awaiting approval.

4.17.2 ENVIRONMENTAL CONCERNS IN AREA B

Area B of Fort Detrick contains 12 areas of environmental concern (Gortva, 2003a). These areas, described below, include: Area B outdoor simulant testing grid (B-Grid); ammunition storage area (B-Ammo); Area B skeet range; B-20 detonation areas; Area B-1 landfill; Area B-11 landfill; Area B-2 landfill; Area B-3 inactive landfill; Area B-6 landfill; Area B-8 landfill; Area B-10 and B-Grove landfills; and the Area B-18 landfill. Burrows, dug by small mammals (e.g., woodchucks [*Marmota monax*]), have been observed throughout the landfill areas of Area B. This burrowing activity has occasionally caused landfill debris to be uncovered in these areas.

4.17.2.1 Area B Outdoor Simulant Testing Grid (B-Grid) (FTD 05)

The outdoor simulant testing grid was installed in the late 1940s to observe the dissemination of biological simulants (non-pathogenic microorganisms such as *Bacillus globigii*). Simulants were airdropped or dispersed as aerosols with detonation of ordnance as a part of the test program. It is reported that limited outdoor testing of simulants may have begun as early as 1944. Residue of explosive containers/casings, such as lead and mercury, may have impacted the soil surface. Currently, the site is used for pasture land for USAMRIID animal farm and leased grazing areas.

Surface and subsurface soil samples show: Mercury levels are below RBCs for the area; and therefore, no further investigation or remediation is required. Iron concentrations in Area B do not appear to be the result of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) release; and therefore, no action based on iron is required. After reviewing data generated during the RI, USAG, MDE, and USEPA have determined that data gaps are present. USAG plans to collect additional RI/Feasibility Study (FS) data. It is anticipated that the additional data will allow Fort Detrick to prepare and submit a decision document to MDE recommending no further action at this site under the Installation Restoration Program (IRP)/Defense Environmental Restoration Program (DERP).

4.17.2.2 Ammunition Storage Area (B-Ammo) (FTD 07)

Prior to 1971, munitions storage and loading facilities were present on the eastern portion of Area B. There were six sub-areas, where munitions were stored in magazines, and a munitions loading building. The storage facilities consisted of eleven aboveground magazines, one earth-covered magazine, and three smaller magazines. The materials were removed, and the buildings were decontaminated in the 1970s. All of the magazines, except Building 1215, were dismantled in 1971. The site currently consists of pasture and storage areas for the USAMRIID animal farm.

Surface and subsurface soils samples were collected. After reviewing data generated during the RI, USAG, MDE, and USEPA have determined that data gaps are present. USAG plans to collect additional RI/FS data. It is anticipated that these additional data will allow Fort Detrick to prepare and submit a decision document to MDE recommending no further action at this site under the IRP/DERP.

4.17.2.3 Area B Skeet Range (FTD 29)

The skeet range is located in Area B and extends fan-like north of a point in the southwest corner. It was used by military and civilian personnel as a recreational skeet range since the 1950s. However, the skeet range was deactivated in 1999. Analytical results for surface and subsurface soil samples showed elevated concentrations of lead. In 2001, the ground surface of the skeet range was scraped to remove the majority of the lead shot and clay pigeon contamination. Soils that did not meet TCLP action levels for lead were removed as hazardous waste. The remaining soils were used as a daily cover material at the Fort Detrick Municipal Landfill. Additional sampling will be conducted to define the extent of any remaining contamination and provide more accurate information for the RI. Based upon limited sampling performed during the removal, it is anticipated that no further remedial actions will be needed for this site.

4.17.2.4 B-20 Detonation Areas (FTD 43)

There are two explosive ordnance disposal areas located in Area B: one in the northern area and the second in the southwestern area within the fan of the skeet range. Area B-20 North was used as a controlled burn area for the destruction of small amounts of explosives. The site is currently an open grassy field. After reviewing data generated during the RI, USAG, MDE, and USEPA have determined that data gaps are present. USAG plans to collect additional RI/FS data. It is anticipated that this additional data will allow Fort Detrick to prepare and submit a decision document to MDE recommending no further action at this site under the IRP/DERP. Area B-20 South was also used as a controlled burn area for the destruction of small amounts of explosives. Surface and subsurface soil samples were collected. Pending determination of background metal concentrations, it is anticipated that no further remedial action will be needed for this site.

4.17.2.5 Area B-1 Landfill (FTD 48)

This 0.5-acre landfill is located in the northeastern portion of Area B. It was reported to have operated from 1948 to the mid-1970s, receiving unknown quantities of scrap metals, wood, and general refuse from laboratory remodeling and building demolition. All construction/demolition debris was decontaminated prior to disposal. The site is currently part of the Flair U.S. Army Reserve Center.

The disposal site was not found to exist in the area identified by pre-RI information. However, within the area originally defined as B-1, no further investigation is required. Based upon the data generated during the RI, Fort Detrick will prepare and submit to MDE a decision document recommending no further action at the area defined as B-1 under the IRP/DERP.

4.17.2.6 Area B-11 Landfill (FTD 49)

This landfill is part of a larger 19.6-acre landfill including sites FTD 69, 70, and 71. It is located on the southwest side of Area B. This site is being investigated for soil and groundwater contamination.

Area B-11 received wastes from Fort Detrick, U.S. Bureau of Standards, and Walter Reed Army Medical Center. Materials disposed included: metals, wood and general waste from laboratory modifications and building demolitions, general housing refuse from Area A, general household refuse from the mid-1950s to the early 1970s, excess laboratory chemicals, TCE and perchloroethylene (PCE) drums, and radiological materials (including radioactive carbon, sulfur, and phosphorus compounds). Groundwater monitoring shows TCE and PCE leaving the Installation at concentrations above MCLs. There is currently limited residential use of this groundwater. Impacted residences were connected to Fort Detrick or the City of Frederick potable water supplies or offered bottled water.

A decision document was signed in FY00 for the interim removal action (IRA) of one known and two suspected chemical waste pits thought to be the source of the TCE and PCE groundwater contamination. The IRA determined that there were four disposal pits with sizes much larger than anticipated. In Spring 2002, heat-sealed vials containing live bacteria were discovered in the excavation. Some of the bacteria were identified as being human pathogens. The discovery

of live bacteria led to significant changes in the scope of the project, including additional disposal costs, biological testing, and disinfection procedures.

The B-11 interim removal action was completed in June 2004. All excavations were backfilled, and the site was covered with soil and reseeded. The remaining areas of the B-11 Landfill will need further sampling and investigation in order to determine future response actions. Intrusive investigations in the remaining landfill areas will be minimized due to the discovery of live pathogens during the B-11 IRA. It is anticipated no further removal actions will be needed for adjacent areas.

4.17.2.7 Area B-2 Landfill (FTD 50)

This 1.2-acre landfill is located in the north-central portion of Area B. It operated between 1948 and the mid-1970s, receiving unknown quantities of scrap metals, wood, and general refuse from laboratory remodeling and building demolition. All construction/demolition debris was decontaminated prior to disposal. The area is currently open grassland used for grazing.

After reviewing data generated during the RI, USAG, MDE, and USEPA have determined that data gaps are present. USAG plans to collect additional RI/FS data in order to determine future response actions. Intrusive investigations in this landfill will be minimized due to the discovery of live pathogens during the B-11 IRA.

4.17.2.8 Area B-3 Inactive Landfill (FTD 51)

This 5.0-acre landfill is located on the north side of Area B. The active portion of the landfill was not investigated as part of the RI. Seven or eight unlined landfills operated from the 1950s to 1990. They received scrap metals, wood, general refuse from laboratory remodeling and building demolition, drums, herbicide and insecticide wastes, and autoclaved animal carcasses. Laboratory glassware is also present. All materials were reported to have been decontaminated prior to disposal. The current site is partially open grassland with the remainder overlaying the current permitted active landfill.

After reviewing data generated during the RI, USAG, MDE, and USEPA have determined that data gaps are present. USAG plans to collect additional RI/FS data in order to determine future response actions. Intrusive investigations in this landfill will be minimized due to the discovery of live pathogens during the B-11 IRA.

4.17.2.9 Area B-6 Landfill (FTD 69)

This landfill is currently undeveloped grassland located in the southwest corner of Area B. From 1948 to 1960, this area received construction material waste (e.g., scrap metal and wood) and autoclaved carcasses of large and small animals. All animal carcasses used in biological agent research were routinely autoclaved, and some were incinerated prior to burial. Possible contamination of this area could include ash, heavy metals, medical waste, and/or biological agents. Due to data gaps present for this site, further investigations for this area are planned. Intrusive investigations in this landfill will be minimized due to the discovery of live pathogens during the B-11 IRA.

4.17.2.10 Area B-8 Landfill (FTD 70)

This landfill is currently undeveloped grassland located on the western side of Area B. From 1948 to 1972, this area received a variety of wastes including construction materials (e.g., scrap metal and wood), general refuse, radiological materials, biological agent liquid waste, and paint sludge from Building 375 and Building 384. After biological warfare work was ceased during 1969 to 1972, stringent decontamination of all holding tanks was completed. Testing indicated that inorganic material from the holding tanks in Building 375 was found to contain *Bacillus anthracis*. This material was thoroughly sterilized and repeatedly tested for anthrax growth after the sterilization procedure was complete. After demonstrating negative test results for anthrax growth, approximately 150 tons of sterilized liquid waste and decontaminated paint sludge was disposed of in the Area B-8 Landfill. Due to data gaps present for this site, further investigations for this area are planned. Intrusive investigations in this landfill will be minimized due to the discovery of live pathogens during the B-11 IRA.

4.17.2.11 Area B-10 and B-Grove Landfills (FTD 71)

This site is currently undeveloped grassland and forested land in the southwestern portion of Area B. From 1965 to 1970, this area received general housing refuse and autoclaved and incinerated animal carcasses. The tree-covered area making up the B-Grove portion of this site was also reported to be a disposal area for unregulated household trash and miscellaneous debris, such as metal containers and laboratory glassware. Due to data gaps present for this site, further investigations for this area are planned. Intrusive investigations in this area will be minimized due to the discovery of live pathogens during the B-11 IRA.

4.17.2.12 Area B-18 Landfill (No Official FTD Site)

This area received a variety of waste up until 1950. The exact location of this landfill has not been determined; however, a ground-truthing survey of a tree area/sinkhole behind Area B-20 revealed surface debris and waste. This may prove to be the true location of this disposal area. A more thorough survey and investigation of this sinkhole area are planned.

4.17.3 ENVIRONMENTAL CONCERNS IN AREA C

Area C was acquired in 1944 and is exclusively used for industrial operations. It includes two small tracts covering 16 acres of land located along the west bank of the Monocacy River, east of Area A. One 7-acre parcel of Area C contains the WTP, which serves the Fort Detrick population. The second parcel is a 9-acre tract of land one-quarter mile downstream from the WTP containing the Fort Detrick WWTP. Several areas of environmental concern have been in Area C, including the sludge stockpile area, sludge during beds, former incinerator (former ash disposal, stack, and downwind areas), fill area, and trickling filters.

4.17.3.1 Former Sludge Stockpile Area

Sludge from the WWTP was stored directly on the ground prior to disposal during the period 1982 to 1988. PCBs and low-level beta radiation were detected in past sludge analyses. Currently the site is an open grass area with trees. No further action will be needed for this area under the restoration program.

4.17.3.2 Sludge Drying Beds

Eight sand beds used to dry sludge generated at WWTP. PCBs and low-level beta radiation detected in past sludge analyses. All eight sludge-drying beds are currently in use. No further action will be needed for this area under the restoration program.

4.17.3.3 Former Incinerator (Former Ash Disposal, Stack, and Downwind Areas)

An incinerator at the WWTP operated from 1944 to 1960s. The incinerator was demolished in 1975. Some ash from the incinerator was disposed on-site. Surface and subsurface samples were taken in February 1999 from the ash disposal area, the area around the location of the former incinerator stack and from locations downwind along the predominate wind direction. Results indicated the presence of dioxins, furans, and arsenic.

In January 2002, the ash and the coincidental fill area were removed from the site and taken to Fort Detrick's permitted landfill. During the removal, potential debris from old incinerator was uncovered (metal beams and cinder block/bricks). This debris was not removed.

A health risk analysis was performed using the results of the soil sampling. For potential future residents who are children, the risk characterization results showed total cancer risks associated with surface soil and total soil were within the target risk range. The total Hazard Indexes for surface soil and total soil exceeded 1. However, no individual chemical or target organ HI was equal to or exceeded 1.

The primary risk drivers included the chemicals benzo(a)pyrene, dioxin/furans, arsenic, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene. On-site arsenic concentrations were compared to background concentrations and were found to be statistically above background levels, suggesting a localized source of arsenic in Area C. Therefore, it is anticipated that land use controls will be required for these areas.

4.17.3.4 Fill Area

A fill area was identified in the northern portion of the WWTP on a 1988 aerial photograph. This area was coincidental to ash disposal site. One surface and subsurface sample were collected in February 1999 and analyzed. Based on those results, no further action will be needed for the fill under the restoration program.

4.17.3.5 Trickling Filters

The main rotating arm in the center of each filter was fitted with mercury seals prior to 1982. The trickling filter distribution box was sampled for mercury in February 1999. Based upon results, no further action will be required under the restoration program.

4.17.4 RESTORATION ADVISORY BOARD

The Fort Detrick Restoration Advisory Board (RAB) was created in 1993 to communicate information to the general public regarding the environmental investigations and cleanup activities being conducted at Fort Detrick. The RAB is composed of members of the community

and governmental representatives of DA, USEPA, and MDE. The RAB performs the following functions (RAB, 2003):

- Conducts regular meetings that are open to the public and facilitates the exchange of information between parties;
- Maintains a mailing list of interested parties and disseminates information about cleanup activities at the Installation;
- Reviews and discusses documents related to cleanup activities; and
- Assists and participates in the cleanup decision-making process.